MONTHLY WEATHER REVIEW,

OCTOBER, 1881.

(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to November 20th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 133 Signal Service stations and 15 Canadian stations, as telegraphed to this office; 186 monthly journals and 161 monthly means from the former, and 15 monthly means from the latter; 212 monthly registers from Voluntary Observers; 55 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from the local Weather Services of Iowa, Nebraska and Missouri, and of the Central Pacific Railway Co.; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

The distribution of mean atmospheric pressure over the United States and Canada for the month of October, 1881, is shown by isobaric lines (in black) upon chart No. II. The area of lowest pressure covering as it does the Canadian Maritime Provinces probably results from a translation northeastward of the area of low for September, embracing at that time the Upper Mississippi valley. Over the interior of the country east of the Mississippi the pressure has rapidly increased during the month, and the area of highest (abnormally high) pressure covers the South Atlantic states. Compared with the past month the pressure is everywhere higher except in the Canadian Maritime Provinces, where the most decided fall of the month has occurred. The region of greatest increase embraces that portion of the country from the Arkansas river northward to the British Possessions.

Departures from the Normal Values for the Month.—Compared with the means for previous years, the mean pressure for the present month is everywhere above the normal east of the 90th meridian, the increase varying from 0.04 to 0.12 inch. Throughout the Rocky Mountain slopes, in the Lower Missouri valley, and in the central portion of the Upper Mississippi valley, the pressure is from 0.01 to 0.06 inch below the normal, the barometer having been slow to recover from the marked deficiencies of these regions during September. In the Plateau regions, South Pacific and North Pacific coast regions, other areas of deficiency exist ranging from 0.01 to 0.13 inch, being most marked in the Middle Plateau. Stations reporting a normal condition are Shreveport, Memphis, St. Louis and Keokuk.

Barometric Ranges.—The range of pressure for the month has generally varied from 0.5 to 1.0 inch, and in the extremes from 0.24 inch at San Diego to 1.2 inches at Yankton and 1.26 inches on summit of Mt. Washington. Throughout the several districts the monthly barometric range varied as follows: New England, from 1.13 inches at Albany, Thatcher's Island and Burlington to 1.26 inches on summit of Mt. Washington; Middle Atlantic states, 0.9 at Lynchburg to 1.13 at Sandy Hook; South Atlantic states, 0.49 at Jacksonville to 0.95 at Norfolk; Eastern Gulf states, 0.5 at Pensacola to 0.57 at Atlanta; Florida Peninsula, 0.36 at Key West to 0.46 at Cedar Keys; Western Gulf states, 0.47 at Castroville to 0.77 at Ft. Gibson; Tennessee and the Ohio valley, 0.55 at Nashville to 0.89 at Morgantown; Lower Lake region, 0.8 at Sandusky to 1.05 at Oswego; Upper Lake region, 0.86 at Port Huron to 1.17 at Duluth; Upper Mississippi valley, 0.67 at Cairo to 1.12 at LaCrosse; Missouri valley, 0.87 at Ft. Bennett to 1.20 at Yankton; extreme Northwest, 1.01 at Ft. Buford to 1.19 at Moorehead; Northern Slope, 0.61 at Cheyenne to 0.91 at Ft. Keogh; Middle Slope, 0.66 at Denver to 0.91 at Dodge City; Southern Slope, 0.46 at Stockton to 0.73 at Jacksboro; Rio Grande valley, 0.49 at Eagle Pass and Laredo to 0.98 at Rio Grande; Southern Plateau, 0.31 at Tucson to 0.42 at Yuma;

Middle Plateau, 0.44 at Winnemucca to 0.56 at Salt Lake city; Northern Plateau, 0.51 at Eagle Rock to 0.75 at Umatilla; North Pacific coast, 0.79 at Roseburg to 0.95 at Olympia; Middle Pacific coast, 0.51 at Sacramento to 0.61 at Red Bluff; South Pacific coast, 0.24 at San Diego to 0.48 at Visalia.

Areas of High Barometer.—There has been a general excess of atmospheric pressure east of the Mississippi river and a general deficiency west of the 100th meridian. The greatest excess is noted in Minnesota, the Lake region, and New England. Associated with this distribution of pressure it is deserving of remark that contrary to the usual rule there was a general excess of temperature in the regions which had a pressure above the mean and a deficiency in temperature in the regions where the pressure was below the mean. Only five high areas have merited discription, all of which occurred before the 20th of the month.

No. I.—On the 2d there was a decided rise in pressure in Manitoba and Dakota. On the 3d the barometer continued rising, the highest readings reported were: Ft. Buford, 30.57 or 0.5 inch above the normal, Ft. Stevenson, 30.51 or 0.45 inch above the normal. On the 4th the observed pressures remained highest in Dakota; the northern portion of that territory being in general more than one half inch above the normal. On the 5th the high area was rapidly transferred to the southeastward. At the end of that day the isobar of 30.4 included the country from the Upper Lake region and Upper Mississippi valley, to the Middle Atlantic and Carolina coast. On the 6th the highest area was in the Middle Atlantic states; the highest pressures reported were, Philadelphia, 30.52; Baltimore, Washington, and Lynchburg, 30.54; Norfolk and Charlotte 30.51. On the 7th and 8th the pressure remained highest in the South Atlantic and East Gulf states, while a slight depression was moving across Canada from Manitoba to the Gulf of St. Lawrence. In connection with this high area, frosts were reported on the morning of the 5th, from the Lake region, Middle states and New England, and on the morning of the 6th, from the Lower Lake region and Middle Atlantic states.

No. II.—On the 8th there was a great rise in pressure in Dakota and Manitoba. On the 9th the high area continued nearly stationary in position, and the highest readings reported were as follows: Fort Buford, 30.62; Fort Garry, 30.63; St. Vincent, 30.63. On the 10th the high area moved over the Lake region, and on the 11th was transferred to the Middle Atlantic states, where, at the morning report, the isobar of 30.6 included Albany, Baltimore and Washington. On the 12th and 13th the highest pressure moved into the South Atlantic states during the passage of low area No. I over the Lake region.

No. III.—On the 12th, in rear of low area No. I, the barometer rose very rapidly in the extreme Northwest, the isobar of 30.6 including nearly all of Dakota and Montana. On the 13th the high area extended over the Lake region, accompanied by high winds on the North Atlantic coast. On the 14th the high area was transferred to New England, and on the 15th it disappeared before the advance of low area No. II, then moving over the Lake region.

No. IV.—On the 15th, following the passage of low area No. II, there was a sharp rise of pressure in the Northwest which, on the 16th, extended over the Lake region; on the 17th the highest barometer was transferred beyond the Maritime Provinces and Nova Scotia; the highest barometer reported was at Father Point, 30.57, or 0.6 inch above the normal.

No. V.—The barometer rose quite rapidly in the Northwest on the 17th in rear of low area No. III. On the 18th the rise extended over the Upper Lake region and the Ohio valley. On the 19th the high area was transferred to the New England coast, and then disappeared in advance of low area No. IV.

Areas of Low Barometer.—The tracks of the centres of six areas of low barometer have been charted for this month. One only—No. I—is traced from the Pacific coast. Three—Nos. II, III and VI—developed in the Rocky Mountain region. Two—Nos. I and II—exhibited great energy in the Lake region. One—No. III—developed great energy on the New England coast. The month is remarkable from the fact that no storm centre passed along the Gulf coast or the Atl ntic coast south of New York, which probably accounts for the deficiency in rain-fall noted in the Middle Atlantic, South Atlantic and East Gulf states.

No. I—On the 10th a depression, unaccompanied by rain, crossed California in an easterly track and, moving with great rapidity, was, at the 11 p. m. report of the 11th, central in the Upper Mississippi valley. On the 12th the low area crossed the Upper Lake region, and, moving up the St. Lawrence valley, it disappeared on the 13th beyond the limits of the chart. On the 11th, 12th and 13th abundant rains fell in the Northwest, Lake region and St. Lawrence valley. Cautionary signals were ordered on the 10th for Lakes Superior and Michigan; on the 11th for Lakes Huron, Erie and Ontario. These signals were generally justified by the following maximum velocities: Duluth, 26 NW; Escanaba, 26 S.; Milwaukee, 32 S; Grand Haven, 36 S.; Alpena, 25 S.; Port Huron, 30 N.; Detroit, 29 S., Toledo, 28 SE.; Sandusky, 32 S.; Cleveland, 27 S.; Erie, 29 S.; Rochester, 34 SW.; Oswego, 26 NE.

No. II.—On the 12th and 13th the pressure was low in Nevada and Utah preceding the development of a centre of depression. On the 14th the low area moved into the Lower Missouri valley. On the 15th the centre of depression advanced with increasing energy and great rapidity over Lakes Michigan and Huron to the mouth of the St. Lawrence. Cautionary signals were ordered

for this storm at all the lake ports. The following are the maximum wind velocities reported: Marquette, 28 NW.; Milwaukee, 34 W.; Grand Haven, 35 S.; Alpena, 28 S.; Port Huron, 30 SW.; Detroit, 27 SW.; Toledo, 28 SW.; Sandusky, 36 SW.; Cleveland, 34 SW.; Buffalo, 26 SW.; Rochester, 28 SW. Cautionary signals were also displayed for this storm on the Atlantic coast from Eastport to New York. The following maximum velocities were reported: Eastport, 25 W.; Boston, 25 W.; Thatcher's Island, 31 S.; Wood's Holl, 38 SW.; Newport, 30 SW.; New Shoreham, 26 SW.

No. III.—The fall in pressure and circulation of the winds in Nebraska and Kansas on the 16th indicated the development of a storm centre in that region. On the 17th the depression moved across the Northwest and the Upper Lake region. On the 18th over the Lower Lakes and New England. Cautionary signals were displayed on the Upper Lakes and Lake Erie on the 17th, but in the Upper Lakes the storm displayed but slight energy. On Lake Erie the following maximum velocities were reported: Detroit, 30 W.; Sandusky, 30 NW.; Cleveland, 27 NW.; Erie, 26 NW. On the Atlantic coast: Thatcher's Island, 42 NW.; Boston, 26 NW.; Wood's Holl, 36 NW.; Newport, 26 NW.; New Shoreham, 36 N.; Sandy Hook, 44 N.; Barnegat, 35 NW.; Cape May, 43 NW.; Breakwater, 44 NW.; Chincoteague, 30 NE.; Cape Henry, 40 NW.; Kittyhawk, 44 NE., Hatteras, 36 NE. It will be noted that the high winds reported on the Atlantic coast occurred after the passage of the storm centre and therefore are to be associated with the rising barometer which succeeded the low area.

No. IV.—On the 19th a depression of slight energy moved in an easterly track as charted over the Upper Lake region into the Province of Ontario. Cautionary signals were ordered for the ports in the Upper Lakes but they were not justified.

No. V.—On the 22d the barometer was low and slowly falling in the Southwest. At the morning report of the 23d a depression had developed, central in Indian Territory. During the day the storm centre moved in a northeasterly track into Indiana. On the 24th it advanced, with diminished energy, over the Lower Lake region, and on the 25th moved across New England. The Cautionary signals ordered for this storm on lakes Erie and Ontario were not justified.

No. VI.—On the 25th and 26th there was a great barometric depression central in Washington Territory, Oregon and Idaho, which extended east of the Rocky Mountains. On the 27th a new centre of depression appeared to be well defined in Colorado and New Mexico. During the day it moved slowly to the northeast exhibiting but slight energy. On the 28th the storm centre advanced into Minnesota and on the 29th it passed over the Lake Superior region beyond the limits of the chart. This storm did not develop any special energy. Cautionary signals were displayed on Lakes Superior, Michigan and Huron and for the western ports of Lake Erie. The following maximum winds were reported: Duluth, 30 W.; Alpena, 28 SE.; Detroit, 27 S.; Sandusky, 27 S.; Cleveland, 29 S. It will be noted that more storm energy was exhibited on Lake Erie than near the track of the centre of low area.

Hurricane at Manzanilla, Mexico.—October 27th, 3 p. m., strong gale from the NE., barometer fell rapidly from 29.1 to 28.0. At about 4.50 p. m. the gale increased to a hurricance, the center of which struck Manzanilla with terrific force and terrible disaster. 28th, 7.50 a. m. there was a lull in the storm of about 10 minutes duration when the wind suddenly changed to the SW. with hurricane force. Every building in the city without an exception was completely destroyed entailing a loss in the aggregate of over $500,000. In the harbor there were present at the time of storm one ship, two barks, two schooners, together with several lighters and small boats. All vessels except one bark were a total loss.

INTERNATIONAL METEOROLOGY.

International charts, Nos. IV and V, accompany the present REVIEW. The former is published for August, 1879, and continues the series of this chart commenced in January, 1877. Chart No. V is prepared for the month of October, 1879, and continues the series of this chart commenced in November, 1877. It will be observed that the numbers of these charts have been changed, being one less in each case. This modification affects only the numerical value and not the character of the charts, having been done because of the discontinuance some time since of the old chart No. IV.

Chart No. IV, shows the mean pressure, temperature and the prevailing direction of the wind at 7.35 a. m., Washington, or 0.43 p. m., Greenwich mean time, for the month of August, 1879, over the Northern and at certain isolated stations in the Southern Hemisphere. Two areas of low pressure, (29.70) are shown upon the chart for the present month, one situated over the Atlantic ocean just south of Iceland, running eastward to include Scotland and westward to the 35th parallel; the other area embraces southwestern Siberia. The isobar of 29.8, commencing near 55° N., 55° W., passes southeastward reaching the 50th parallel near the meridian of 30° W., thence eastward along that parallel to 10° W., where its course changes to NE., reaching the Baltic near Wisby; at this point it turns to the N., curving around the Gulf of Bothnia to the west and passing thence eastward to the White Sea; from this locality the isobar runs southwestward to near the Black Sea, thence eastward to the Caspian, where it curves again to the southwest reaching the Mediterranean north of Beirut. This disposition of pressure places the western half of Russia and the whole of Asia, except scattering coast stations, within the area of 29.8. It will be seen

that upon leaving the eastern coast of Asia the pressure gradually rises, being about 29.9 over the Japan Islands. If we may be allowed to base judgment upon the reports of isolated stations between the parallels of 60° and 70° N., it is safe to conclude that the area of 29.8 surrounds the Artic ocean. The pressure over the United States nowhere falls below 29.9, except in California, where, in the central portion of the state a small area of 29.8 probably exists. Over British India the pressure ranges from 29.4 to 29.8. The area of highest pressure (30.2) covers a very irregular portion of the ocean southwest of the Azores. In the United States the maximum pressure (30.0) covers the Gulf and South Atlantic states, Tennessee and the Ohio valley. In Europe the barometer is everywhere below 30.0 except in extreme southwestern France, northern Spain and in Portugal. The extreme mean pressures for the month are 29.4 (lowest) at Lahore and 30.23 highest) at Ponta Delgado. The extreme monthly range of mean pressure is 0.83 inch, which is 0.05 inch larger than August, 1877, and 0.12 inch larger than August, 1878. The following extreme monthly mean temperatures are given in Fahrenheit's scale: lowest, Godthaab, York Factory and Ft. St. Michaels, 45°; Stykkisholm, 53°; Moose Factory, 57°; Nikolaievsk on the Amoor, 58°: highest, Biskra, 102°; Laghouat, 97°.2; Saida, 91°.9; Tebessa, 91.°8; Lahore, 91°; Beirut, 88°; Tashkend, 86°. The prevailing direction of the winds over the United States, was *southwest* to *northwest* along the Middle Atlantic and New England coasts, in the Lake region and over the Canadian Maritime Provinces; *northeasterly* along the South Atlantic and Gulf coasts; *southerly* in the interior and westward to the Pacific. Over the Atlantic ocean, *northeast* to *southeast* and *southwest* south of parallel 40° N., and to the northward of that parallel *southwest* to *northwest*. Over Europe, *south* to *west* in Scandinavia and the British Isles; *southwest* to *northwest* in the interior; elsewhere *variable*. In Algeria *northerly*. In Hindoston *westerly* and along the Asiatic coast *southwesterly*. Compared with August, 1877 and 1878, the temperature over the United States is generally higher over the Plateau and Pacific coast regions and in southern Texas, elsewhere it is lower particularly over the interior and in the eastern districts. The pressure is everywhere lower, being most marked on the Pacific coast and in the Gulf and Atlantic coast states. Over the Atlantic, where comparison can only be made with 1878, the region of highest pressure shows an increase of from 0.1 to 0.15 inch. There is a general rise south of the 40th parallel, while to the northward the deficiency ranges from 0.05 to 0.2 inch being most marked between the parallels of 55° and 65° N. The temperature is lower between the parallels of 50° and 60° N., but to the southward there is very little change. Over Europe there is a general rise in pressure south of the 50th parallel being most marked along the northern shores of the Mediteranean, while to the northward the reverse takes place principally over Scandinavia and the northern portion of the British Isles. With regard to the temperature there is a very marked rise over northern Europe, particularly Scandinavia and northwestern Russia; in the interior there is a slight fall which disappears to the southward where along the Mediteranean there is little or no change. In Algeria there is quite a marked rise in temperature and a decided fall in pressure. In Hindostan the changes in temperature and barometer are quite irregular; in the northern Provinces there is a general fall in both while to the southward the deficiency in pressure is quite evident. The accompanying table shows the deviations in temperature and barometer at isolated stations for the month of August, 1879, as compared with the means of the past two years.

Comparative Thermometric and Barometric Means, with corresponding Departures.

Station.	Mean Temperature.			Mean Barometer.			Station.	Mean Temperature.			Mean Barometer.		
	August, 1877-78.	August, 1879.	Departure.	August, 1877-78.	August, 1879.	Departure.		August, 1877-78.	August, 1879.	Departure.	August, 1877-78.	August, 1879.	Departure.
	°	°	°					°	°	°			
York Factory	49.8	45.1	−4.7	29.84	29.98	+0.14	Bridgetown	85.0	82.5	−2.5	30.00	29.95	−0.05
Godthaab	45.9	45.1	−0.8	29.92	29.74	−0.18	Navassa	81.7	83.2	+1.5	29.98	29.95	−0.03
Stykkisholm	50.9	53.1	+2.2	29.93	29.74	−0.19	Medellin	71.6	65.6	−6.0	.....	.....	.....
Tromso	50.0	58.5	+8.5	29.80	29.75	−0.05	San Jose de Costa Rica	65.9	67.1	+1.2	.....	.....	.....
Thorshavn	51.8	52.0	+0.2	29.89	29.72	−0.17	Mexico	56.7	56.7	N'm'l	30.13	30.00	−0.13
Archangel	57.6	61.3	+3.7	29.73	29.82	+0.09	Melbourne	50.1	49.6	−0.5	30.11	30.12	+0.01
Ekaterinburg	64.2	60.8	−3.6	29.73	29.70	−0.03	Hobart Town	49.8	47.4	−2.4	29.85	30.01	+0.18
Barnaul	70.4	62.4	−8.0	29.77	29.68	−0 09	San Juan de Puerto Rica	81.9	80.4	−1.5	29.99	29.99	Norm'l
Yeniseisk	66.8	58.5	−8.3	29.74	29.77	+0.03	Nassau	84.3	84.1	−0.2	30.01	29.99	−0.02
Nikolaievsk, on the Amoor	59.3	58.1	−1.2	.....	.....	.....	Havana	81.4	82.5	+1.1	30.00	29.95	−0.05
Pekin	78.2	77.4	+2.2	29.79	29.72	−0.07	Astrakhan	79.4	81.0	+1.6	29.88	29.82	−0.06
Zi-Ka-Wei	75.9	80.2	+4.3	29.82	29.80	−0.02	Athens	87.8	88.7	+0.9	29.89	29.89	Norm'l
Tokei	75.5	77.4	+1.9	29.87	29.82	−0.05	Lahore	95.2	91.4	−3.8	29.50	29.48	−0.02
Tashkend	79.7	86.0	+3.3	29.75	29.63	−0.12	Tiflis	84.4	83.7	−0.7	29.80	29.78	−0.02
Nukuss	84.8	85.8	+1.0	29.76	29.73	−0.03	Laghouat	94.1	97.2	+3.1	30.08	29.98	−0.10
Beirut	90.0	88.0	−2.0	29.80	29.74	−0.06	Fort de France	80.7	79.2	−1.5	29.91	29.82	−0.09
Mauritius	71.2	70.9	−1.3	30.19	30.18	−0.01	Yokohama	73.9	77.8	+3.9	29.83	29.83	Norm'l
Fort Napier	69.1	69.8	+0.7	30.01	30.04	+0.03	Lisbon	76.9	75.7	−1.2	30.03	30.05	+0.02
Cape Town	54.3	62.2	+2.9	30.20	30.17	−0.03	Madrid	83.1	92.8	+9.7	.....	.....	.....
Free Town	80.4	78.8	−1.6	30.00	30.00	Norm'l	Cagliari	85.4	84.7	−0.7	29.93	29.97	+0.04
Paramaribo	81.7	81.2	−0.5	30.03	30.01	−0.02	Gibraltar	78.9	81.9	+.30	29.96	29.97	+0.01
Funchal	76.9	75.0	−1.9	30.10	30.12	+0.02	Sandwick Manse	57.0	56.0	−1.0	29.80	29.69	−0.11
Ponta Delgado	75.2	78.1	+2.9	30.08	30.23	+0.15	Malta	84.7	83.9	−0.8	29.95	29.94	−0.01
Angra	72.2	74.3	+2.1	30.07	30.18	+0.11							

Chart No. V.—This chart displays the tracings of the probable courses of thirty-one of the principal storm areas of the Northern Hemisphere for the month of November, 1879. The approximate paths of progressive movement are based upon daily simultaneous international observations to the number of over 650, besides a large mass of irregular data which reaches this office in various ways from the logs of vessels of the merchant marine of the North Atlantic ocean. Concerning the general distribution of the paths of the areas of barometric minima the following is given: Fourteen areas traversed portions of the United States, but none of them were entirely confined to its boundaries; four of these came from the Pacific ocean between the parallels of 40° and 50° N.; five first appeared in the Rocky Mountain regions; ten reached the Atlantic ocean, four of which crossed the same to the mainland of Europe. Of the storms over the Atlantic, one came from the West Indies; one formed in the vicinity of the Azores and one in the vicinity of the Cape Verd Islands. Of the storms over Europe, six came from the Atlantic ocean, one of which entered the continent over Portugal and the remainder came from between the parallels of 60° and 70° N.; one storm was confined almost entirely to the Mediterranean, while another first appeared in the vicinity of the White Sea. Off the Asiatic coast three storms first appeared over the China Sea and two others formed over the ocean southeast of the Japan Islands, all moving to the northeastward. Of the storms in North America, No. I appeared in the Lower Missouri valley during the 1st, accompanied by heavy snow-falls and brisk to high winds. By morning of 2nd it covered Lake Michigan, and during the day passed eastward over the Lower Lake region, accompanied by dangerous winds and heavy snow; 3d, central in southern New York and by the following morning had passed eastward over the ocean south of Nova Scotia. Following the passage of this area off the New England coast heavy northerly and westerly gales, with snow, prevailed during the latter part of the 3d and throughout the 4th. 3d, in 39° N., 66°, 40′ W., heavy N. gale, bitterly cold, stormy sea; in 43°, 36′ N., 59°, 24′ W., violent westerly gale; in 42° N., 64°, 58′ W., WNW. to NE., very changeable and stormy. 4th, in 45°, 01′ N., 54°, 06′ W., SE. to SW. gales, with fog and snow; in 40°, 27′ N. 41°, 44′ W., northeasterly gales, with violent squalls of snow and hail; in 42°, 21′ N., 64°, 26′ W., ESE, SW. and W., fierce squalls; in 43° N., 52° W. gale from ESE., veering to W., with very high confused sea and heavy rain. 5th and 6th, depression moved slowly northeastward in the vicinity of 50° N. and between the parallels of 30° and 50° W. Vessels arriving in New York harbor on the 6th reported the experience of violent gales and heavy snow during the 4th and 5th, the latter having collected to the depth of from 6 to 10 inches on their decks. 5th, large icebergs were encountered in 47°, 08′ N., 47°, 30′ W., and in 47° N., 47°, 40′ W. 6th, in 50°, 08′ N., 41°, 45′ W., SW. to NW. strong gale, heavy cross seas; in 46°, 25′ N., 42°, 15′ W., S. to NW. fresh gale, high sea; in 49°, 46′ N., 43°, 40′ W., a chain of icebergs were encountered bearing from NNE. to S. by E., and small pieces were scattered in all directions. During the 7th, as the central area passed northward off the western coast of Iceland the barometer at Stykkisholm fell from 29.76 to 29.09 by morning of the 8th, winds shifting from SW. to S. and W. As the depression moved eastward near parallel 70° N. the pressure rose rapidly over the island, (0.74 inch in 24 hours,) with winds shifting to east. 9th, central off the northwestern coast of Norway; Brono, 29.21, a fall of 0.64 inch in past 24 hours, SW., heavy rain; Tromso, 29.21, a fall of 0.47 inch, S., cloudy; Bergen, 29.84, a fall of 0.34 inch, S., heavy rain. 10th, central over Lapland; Haparanda, 28.83, NW., a fall of 0.86 inch; Tromso, 29.19, NW.; Archangel, 28.98, a fall of 0.80 inch, SE., snow; St. Petersburg, 29.42, a fall of 0.62 inch, WNW., cloudy. 11th, central east of the White sea; Archangel, 29.00, SSW., cloudy. 12th, central south of the Gulf of Ob, disappearing on the following day north of Yeniseisk, at which station southerly winds and snow had prevailed since the 11th. No. IV.—On the 4th an extensive area of low pressure entered North America from the Pacific ocean near the 50th parallel and moved slowly eastward in that latitude, reaching Manitoba by the 7th, where the central area was enclosed by the isobar of 29.40. During this day and the following the depression moved slowly eastward over the southern portion of Hudson's Bay Territory, the barometer at Moose Factory, James' Bay, falling to 29.28, wind SW., force 6. 10th, passed eastward off the southeastern coast of Labrador and by the morning of the 12th had probably reached the ocean in the vicinity of 60° N., 40° W. The following data is from Godthaab during the passage of the depression to the south and east of Greenland: 10th, 29.89, ENE.; 11th, 29.74, ENE.; 12th, 29.38, NE.; 13th, 29.17, N.; 14th, 29.32, WSW.; 15th, 29.49, NNE. On the approach and passage of the depression Stykkisholm, Iceland, reported the following: 12th, 30.26, E.; 13th, 29.59, SE., rain; 14th, 29.24, S., rain; 15th, 29.16, calm, rain; 16th, 29.30, SW., rain; 17th, 29.40, S., rain; rain continued at this station until the 21st. 17th, depression central off the western coast of Norway; Tromso, 29.12, a fall of 0.65 inch, SW., rain; Brono, 29.60, a fall of 0.37 inch, WSW., threatening; Christiana, 29.89, a fall of 0.19 inch, SSW., rain and snow. 18th, disappeared north of Scandinavia, the pressure at northern stations rising rapidly from 0.10 to 0.60 inch and winds shifting to south. No. VIII.—This area developed over the Middle Plateau during the 6th and 7th, and passed rapidly eastward into Colorado and thence northeastward to the Upper Lakes, accompanied in Arkansas and Missouri by violent local storms. During the 9th, moved eastward over northern Canada, reaching the Gulf of St. Lawrence by the 10th, and a position in about 50° N., 50° W., by the 11th. 12th, central in about 50° N., 40°

W.; in 49° N., 41°, 30′ W., 29.34, NW., force 6; in 49°, 20′ N., 31°, 40′ W., 29.15, S., heavy rain; in 50°, 40′ N., 31°, 25′ W., 29.50, SSE., force 6: in 51°, 19′ N., 35°, 55′ W., SE. strong gale, rain, heavy sea; in 38° N., 42° W., hurricane from NW. for 36 hours, hove to under bare poles for 12 hours. 13th, in 50°, 01′ N., 43°, 36′ W., W. to NW., fresh gales; in 48°, 32′ N., 37°, 11′ W., 29.32, S. to N., stormy, very high sea; in 49°, 20′ N., 38°, 15′ W., 29.34, N., violent gale, with rain. 14th, in 42° N., 38° W., hurricane from SW. to NNE.; in 41°, 20′ N., 41°, 50′ W., sudden gale, wind came from N. with great fury and in three hours raised a tremendous sea, decks swept; in 40° N., 41° W., heavy gale from NE. to NW., lasting 24 hours, then shifting to SW. and continuing for 8 hours; in 47°, 10′ N., 43°, 50′ W., 29.72, NW., hurricane; in 48°, 30′ N., 30°, 45′ W., 29.65, NW., violent gale. 15th, in 27° N., 36° W., heavy gale from WSW., lasting 36 hours; in 40° N., 40° W., hurricane from SE. to NW., high confused sea; in 41° N., 36° W., violent N. gale and tremendous sea, vessel thrown on beam ends and abandoned. 16th, together with area No. IV then central off the eastern coast of Iceland an elongated area of low pressure, (generally below 29.60,) extended southward to near the Azores. On the 17th areas No. IV and No. VIII combined to the northward of the British Isles, accompanied by a rapid fall in the barometer, the central area being inclosed by the isobar of 29.20. No. X.- This area appears to have moved southward along the North Pacific coast to near the 35th parallel, when it changed its course to the eastward, crossing California south of San Francisco, at which station the barometer fell to 29.26, the lowest reading reported in the past nine years. Its passage through the Middle and Southern Pleateau regions was accompanied by heavy snow and rain. From Colorado northeastward the depression moved very rapidly to Lake Superior by afternoon of the 11th and thence southeastward over Canada to northern New York, disappearing during the 12th and 13th over the Canadian Maritime Provinces under the influence of areas Nos. VIII and XII, probably combining with the former off the Banks of Newfoundland. No. XII,—Following the passage of area No. X over the Southern Plateau the pressure remained comparatively low developing on the 11th an area of 29.60 over New Mexico. During the 11th this depression moved east-northeast to the Upper Mississippi valley, where it was central morning of the 12th. From this position it moved eastward over the Lake region, accompanied by storms of wind and rain; heavy thunder storms were experienced in southern New York. 13th, central off the Massachusetts coast and during the day probably disappeared in a trough of low pressure extending westward from 44° N. 35° W., to near 65° W. No. XIII appeared off the North Pacific coast during the 11th and passed rapidly eastward over the northern territories, reaching Lake Superior by morning of the 15th, where the central area was inclosed by the isobar 29.60, the lowest barometer being at Duluth 29.42. Owing to the presence of area No. XVII, on this day central south of Lake Erie, an extensive area of barometric minima formed over the Lake region, Ohio valley and Canada which, during the day, combined the effects of the two areas resulting in a single area, (No. XVII,) which, on the 16th became central over Newfoundland. No. XIV.—Resulting from a general fall in the barometer from Texas northward to Hudson's Bay forming a barometric trough of 29.80, this depression appeared central in the southern portion of the Upper Mississippi valley on the 13th. During the day it passed northeastward to Lake Michigan, accompanied in the States of Illinois, Indiana and Kentucky by heavy rains and thunder storms, causing considerable damage to property. On the 14th passed northeastward into northern Canada, disappearing on the following day as an individual area in the extensive depression formed by the combination of areas No. XIII and XVII over the Lake region and Canada. No. XVI.—This area first appeared over the Middle Rocky Mountain region where, on the 15th, it was accompanied by snow and high westerly winds. During the 16th the central depression extended rapidly southeastward into Texas, followed by northwesterly winds and increasing precipitation. From Texas the course of the depression changed to east-northeast, moving across the northern portion of the Gulf states and thence northeastward passing off the Virginia coast near the 37th parallel on the 18th. During this portion of its course after leaving the Gulf states, the winds shifted to northerly over the Lower Lakes, accompanied by heavy snow storms and severe gales with considerable loss to shipping. Over the ocean an extensive area of low pressure formed in the vicinity of 35° N., 70° W., accompanied by violent gales and much damage to shipping. 18th, in 39° N., 66° W., hurricane from SE. to NW., lasting five hours, then to SW., lasting three days; off Cape Lookout, 3 a. m. took heavy NE. gale, wind suddenly shifted to SE. and about two hours thereafter veered to SW. In 41°, 42′ N., 64°, 40′ W., 8 p. m., ESE., gale rapidly increasing in force and slowly veering to the SE. and S., barometer rapidly fell to 29.47. 19th, passed northeastward south of Nova Scotia and disappeared as an individual depression under the influence of area No. XVIII advancing from the southwest, or possibly by a rapid movement eastward continued as area No. XX central north of the Azores on the 19th. On this day an area of low pressure (probably about 29.70) prevailed over the ocean between the parallels of 35° and 45° N. and the meridians of 20° and 60° W. In 40°, 09′ N., 68°, 56′ W., 6.30 a. m., wind shifted from SE. to NE., increasing northerly sea, barometer rising; at midday wind again shifted through W. to NE., with hurricane force, barometer 29.00; at evening wind shifted to NW., with hurricane force, very heavy NW. sea. In 33°, 37′ N., 73°, 20′ W., heavy gale from NW., lasting 10 hours, barometer 29.25; in 39° N., 68° W., heavy gale from ESE. to WNW., tremendous sea; in 42°, 38′ N., 53°, 24′ W., NNW., SW. SE. and W., strong gales and rain; towards morning strong westerly gale

and heavy cross sea. In 47°, 25′ N., 44°, 28′ W., NW. and W., severe gales, barometer falling rapidly; in 45°, 30′ N., 55°, 14′ W., hurricane from W. to NW., lasting 20 hours. No. XVII.—This area developed over the Lower Lakes on the 15th as an offshoot of an extensive area of barometric minima covering the country between the parallels of 40° and 50° N., and the meridians of 70° and 100° W. During the day this depression passed northeastward to the Gulf of St. Lawrence, where it was central on the 16th, moving thereafter to the southeast over Newfoundland, being central by morning of the 17th in the vicinity of 50° W. In 44°, 50′ N., 53°, 20′ W., 29.87, NNW., force 7; in 50°, 56′ N. 44°, 48′ W., SW. to NW., strong storm, high seas. During the day course of depression changed to the NE., being central on the 18th in about 50° N., 30° W., after which it again changed, moving almost directly north to the western coast of Iceland, rounding the island to the northward and passing thence eastward to northern Scandinavia. 18th, in 50°, 50′ N., 32°, 10′ W., heavy SE. gale shifting to NE., with high confused sea. The following observations were reported from Stykkisholm, Iceland, during the advance and passage of the depression: 18th, 29.29, SW., force 5, rain; 19th, 29.74, calm, rain; 20th, 29.64, S., force 6, rain; 21st, 30.33, SW., force 1, clearing; 22d, 30.63, NE., force 4, fair. Owing to the presence of an extensive area of high pressure over the British Isles and to the westward over the ocean, the change in pressure over Iceland during the passage of the depression was extremely sudden. On the 22d, with diminished energy, the depression became central off the northwestern coast of Norway and during the day passed southeastward into Finland. 24th, central southeast of the White sea, followed to the westward over Finland and vicinity by S. to N. and NW. winds, with snow. 25th, central in western Siberia, with slowly increasing pressure; Kasan, 29.89, NNW., snowing; Ekaterinburg, 29.82, SW., threatening. 26th, central in the valley of the Yenisei, disappearing thereafter over central Siberia; Yeniseisk, 29.72, a fall of 0.21 inch in past 24 hours, W., threatening; Barnaul, 30.04, a fall of 0.43 inch, SW., cloudy. No. XXII.—During the 18th, while No. XVI occupied the South Atlantic coast a very sudden fall in the barometer occurred over the Lake Superior region and to the northward developing on the following morning into an area of 29.40. 19th, Moose Factory, 29.26, a remarkable fall of 1.13 inches in past 24 hours, wind S., force 6, heavy snow-storm; Marquette, 29.51, a fall of 0.89 inch, winds from N. to W.; Duluth, 29.66, a fall of 0.82 inch, winds from NW. to SW.; Alpena 29.69, a fall of 0.67 inch, winds from N. to SSW. During the day the storm passed southeastward over the Lake region, where heavy southwest to northwest gales, with snow, prevailed, driving many vessels ashore and wrecking others. This storm proved to be one of the severest for many years upon the Lakes, causing great damage by shipwreck and the loss of many lives. Over Canada and New England the storm was equally severe being accompanied by violent southwest to northwest winds and snow. By afternoon of the 20th the depression had combined with No. XVIII, the West India hurricane, then central off the Nova Scotia coast; lowest barometer at Halifax, 28.59, a fall of 1.10 inches in past 24 hours. Magdalen Islands, violent gale from SE. veering to NE., and increasing to a hurricane. Strait of Canso, heavy SE. gale. At Cow Bay, Louisburg and Glace Bay, hurricane from SE. to SSW. On the Graspe coast and in Northumberland Strait, heavy NE. gales accompanied by high tides, the latter causing considerable damage at Point du Chêne. A further description of this storm is to be found under area No. XVIII, of which it formed a part on and after the 20th. No. XXIII.—This area passed southeastward from the Saskatchewan valley during the 20th and 21st and by morning of the 22d was central north of Lake Superior inclosed by the isobar of 29.40. During this day the depression passed southeastward over the Upper Lake region followed by winds shifting from SW. to NW., increasing to high and accompanied by snow. Central over the Province of Ontario on the 23d the depression changed its course more to the east, reaching the Gulf of St. Lawrence by the following morning, disappearing thereafter in an area of high pressure (30.30) prevailing to the southward. No. XXV—Following rapidly the passage of the preceding area the pressure on the 24th again fell in the Northwest and Manitoba; Ft. Garry, 29.48 a fall of 0.80 inch in past 24 hours; Pembina, 29.49, a fall of 0.75 inch; Breckenridge, 29.67, a fall of 0.67 inch. During the day the depression passed rapidly northeastward to Hudsons Bay, lowest barometer, 29.41, at Moose Factory, James Bay, a fall of 0.50 inch in past 24 hours. During the 25th the area passed eastward into Labrador, and disappeared on the following day under the influence of a high pressure (30.20 to 30.40), to the southward. No. XXIX.—This depression appearing in Idaho on the 25th, probably passed southward from the British Possessions during the continuance of an extensive area of low pressure which prevailed over the Saskatchewan valley on the 24th, and later moved eastward as area No. XXV. During the 25th and 26th, the depression moved southeastward into New Mexico: thence changing its course to the northeast it reached the Upper Lake region by morning of the 28th, where the central area was inclosed by the isobar of 29.60, and the area of precipitation embraced the Lake region, the Ohio and Upper Mississippi valleys, in the first of which regions a severe storm of wind, rain, and snow prevailed throughout the day. 29th, central over northern Maine with diminished energy, the latter fact owing to the presence of three areas of high pressure (30.40) situated as follows: one in 55° N., 30° W., another in 40° N., 55° W., and the third in 35° N., 95° W. 30th, depression central over the Gulf of St. Lawrence. The further course of this area will appear on the December chart. No. XXX.—On the 26th, an extensive area of barometric minima covered the country between the parallels of 30° and

45° N., and from the 95th meridian westward to the Pacific. This depression embraced the present area and No. XXIX, the latter then central in the Middle Rocky Mountain region. During the 27th and 28th, area No. XXX moved northeastward over the Lake region and Canada, in connection with No. XXIX, but somewhat in advance of, and a little to the north of the latter. On the 29th these two areas combined in the Lower St. Lawrence valley, moving eastward thereafter as area No. XXIX. No. XXXI.—The presence of this area on the north Pacific coast, on the morning of the 29th, caused general rain throughout northern California, Oregon, and Washington Territory, and a fall in pressure of from 0.20 to 0.40 inch. During the day the depression moved northeastward into the British Possessions, where on the morning of the 30th it appeared central in the Saskatchewan valley. Its course thereafter will probably appear on the December chart. Of the storms over the Atlantic the following descriptions are given: No. XVIII, a storm of cyclonic origin, probably developed on the 16th over the Caribbean sea, south of Hayti; St. Thomas, 29.97, SE., heavy rain; Navassa, 29.89, N., fair; Kingston, Jamaica, 30.12, NW., fair; Havana, 30.03, calm, clear; Nassau, 30.06, NE., fair. 17th, St. Thomas, 29.93, SE., cloudy; Navassa, 29.85, NE., cloudy; Kingston, Jamaica, 30.10, calm, fair; Havana, 30.00, calm, clear; Nassau, 30.03, NE., fair. 18th, probably central over eastern Cuba; Navassa, 29.87, NE., fair; Kingston, Jamaica, 30.09, calm, fair; Nassau, 30.04, NE., threatening; Havana, 29.94, calm, fair; Grand Turk, Bahamas, 29.75, a fall of 0.10 inch in past 24 hours, ESE., strong gale. 19th, Nassau, 29.86, SE., fair; Grand Turk, Bahamas, 29.70, S., strong gale; Havana, 29.87, SW., cloudy. During the day the depression curved to the northeast in about 30° N., 78° W., and the southwesterly winds accompanying area No. XVI along the South Atlantic coast shifted to N. and NE., with rain and slowly falling pressure. Over the ocean heavy gales were experienced causing much damage to shipping, as follows: schooner *Victor*, from Baracoa, Cuba, to New York, had severe NW. gales in Gulf stream, lasting 12 hours; schooner *Kit Carson*, from Miragoane, Cuba, for New York, experienced very violent NNE. gales, vessel fell off in trough of sea, decks swept; ship *Stewart Freeman*, 200 miles off Cape Henlopen, had hurricane from NW. and was blown off nearly to the Bermudas; in 36° N., 75° W., severe NNW. gale; in 34° N. 72° W., severe hurricane from E. by S. 20th, depression central in about 38° N., 70° W., inclosed by the isobar of 29.00; in 34°, 06′ N., 73°, 41′ W., hurricane from east veering to NW., last several hours; in 34°, 60′ N., 73°, 30′ W., brig *Shannon*, from Cape Haytien to New York, had revolving gale beginning at ENE., and backing to NNW., perfect hurricane, heavy cross seas; in 41°, 13′ N., 63°, 18′ W., terrific gale from SE. to NW., veering to S. and lasting 48 hours; ship *Derenon*, north of Cape Hatteras, terrific gale from SSW., veering to N., vessel on beam ends for six hours; in 32°, 05′ N., 70°, 30′ W., bark *B. F. Watson*, on edge of revolving gale begining at S. and hauling to W., barometer 29.30; in 34°, 31′ N., 70°, 10′ W., hurricane from SW. veering to NW. lasting 24 hours; in 32°, 20′ N., 73°, 20′ W., very heavy storm commencing at ESE., and veering suddenly to W., heaviest from WSW., lasting 4 hours and then settling down to a heavy gale from the NW., which continued for 36 hours; in 42°, 30′ N., 61°, 30′ W., SE. to SW., heavy gales, barometer fell to 28.90; in 38°, 22′ N., 69°, 30′ W., terrific gale from SW., veering to NW., lasting 48 hours. On the 20th, as the storm advanced northeastward, northerly gales with light to heavy snow, prevailed over the Canadian Maritime Provinces; on Newfoundland Banks, hurricane from ESE., with a blinding snow storm and tremendous sea; on Manicougan Shoals, mouth of St. Lawrence, 7 p. m., violent snow storm. After combining with area No. XXII off the Nova Scotia coast, the depression by morning of the 21st was probably central, but with diminished energy over the Gulf of St. Lawrence; Sydney, C. B., 29.15, a fall of 0.68 inch, SW., cloudy; Chatham, 29.11, a fall of 0.69 inch, W., cloudy; Charlottetown, 29.09, a fall of 0.66 inch, W. clearing; in 38°, 50′ N., 61°, 56′ W., terrific squalls and tremendous sea, vessel thrown on beam ends; in 40°, 25′ N., 72°, 54′ W., WNW., hard gale, high sea; in 43°, 28′ N., 56°, 38′ W., hard gale from WNW., shifting to SW. 22nd, depression central in about 50° N. 45° W., followed over the Canadian Maritime Provinces by westerly winds, rising pressure and clearing weather; in 43°, 06′ N. 53°, 18′ W., W., strong gale, fierce hail squalls, high confused sea; in 46°, 30′ N. 51°, 26′ W., SW. to W., strong gale, high sea; in 40°, 52′ N., 63°, 37′ W., W. by N. and NW., strong gale, high sea, clearing weather; in 40°, 45′ N., 60°, 29′ W., NW., strong gale, fierce squalls. By morning of the 23rd the depression had disappeared under the influence of a high pressure area (30.40) which rapidly advanced from the southwest and combined with a similar area occupying the ocean in the vicinity of 50° N. 30° W. No. VI.—During the 5th the barometer fell from 0.10 to 0.30 inch in the vicinity of 25° N. 25° W., developing on the 6th an area of 29.80, with the lowest pressure, 29.74, in 24°, 14′ N. 23°, 30′ W., accompanied by SW. squalls and rough sea. From the 6th to the 8th the depression moved slowly northward to the Azores, where on the latter date the lowest pressure was reported from Ponta Delgado, 29.74, a fall of 0.17 inch in past 24 hours, wind NE. On this day the depression curved to the eastward, followed on the 9th by a rise in pressure of from 0.10 to 0.20 inch over the Azores, with clearing weather. During the 10th and 11th disappeared in an area of high pressure (30.40) which moved southwestward from the Bay of Biscay. No. XX.—As previously stated under the description of area No. XVI, which on the 19th was central south of Nova Scotia, a very extensive area of low pressure covered the ocean on this day between the parallels of 40° and 50° N. Reports from

the logs of vessels are not sufficiently numerous and reliable to decide the probability of a connection between areas No. XVI and XX so far, at least, as to say that they were one and the same storm. Central north of the Azores on the 19th with the lowest pressure about 29.75, the depression moved southeastward. On the morning of the 21st the central area was inclosed by the isobar of 29.40, but by the following morning with a further movement eastward the pressure had rapidly increased and the depression was marked by the isobar of 29.70. During the 22d and 23d disappeared under the influence of a high pressure area (30.20 over Algeria and southern Spain. No. XXIV.—Immediately following the disappearance of area No. XX the pressure fell over the ocean south of the Maderia Islands and on the 23d the barometer at Funchal rose 0.10 inch, with winds shifting from SW. to ENE. 25th, depression central between the Azores and Maderia Islands; Ponta Delgado, 29.62, a fall of 0.33 inch in past 24 hours, wind shifted from E. to NE., force 6; Angra, 29.80, a fall of 0.21 inch, wind NE.; Funchal, 29.58, a fall of 0.20 inch, wind shifted from NE. to S. Along the coasts of Portugal and Spain the barometer fell from 0.10 to 0.20 inch, with southerly winds and rain. 26th, depression changed its course to the eastward being central north of the Maderia Islands; Funchal, 29.31, a fall of 0.25 inch, SW., rain; in 31°, 35′ N., 16°, 50′ W., 29.35, SW., force 7, rain; Ponta Delgado, 29.49, NE., force 6, rain. 27th, central off the coast of Portugal; Lisbon, 29.19, a fall of 0.44 inch, SW., heavy rain; Santiago, 29.28, a fall of 0.39 inch, NE., force 7, heavy rain; in 35°, 40′ N., 14°, 25′ W., WNW., force 6, cloudy; Funchal, 29.48, W., clearing; Madrid, 29.45, S., cloudy; San Fernando, 29.54, a fall of 0.20 inch, SSW., rain. 28th, depression central with increased pressure, in northern Spain, lowest barometer at Santiago, 29.30. During the day passed eastward over the Mediterranean, being central on the 29th near Malta inclosed by the isobar of 29.60. The barometer along the southern coast of France fell from 0.10 to 0.15 inch with winds shifting to N. and NE., with rain. 30th, depression central, with diminished pressure, over Italy, inclosed by the isobar of 29.40, lowest barometer, at Pesaro, 29.29, a fall of 0.43 inch in the past 24 hours; rain generally prevailed throughout the kingdom. The further course of this area will appear on the December chart. Of the storms over Europe the following descriptions are given: No. II.—Following the the passage over northern Scandinavia of area No. XVII of the October chart, the pressure on the 1st fell quite suddenly over southern Scandinavia, lowest barometer at Christiania, 29.38; rain quite general over Norway and Sweden, with northeast to southeast winds. 2d, depression central over the Baltic, pressure at the centre gradually increasing; the area of precipitation greatly enlarged, embracing eastern Scandinavia, Germany, Austria and western Russia; snow was reported from Brono, Dorpat and St. Petersburg. 3d, central south of the Gulf of Finland, lowest barometer at St. Petersberg, 29.35, a fall of 0.36 inch in past 24 hours, NNE., snow; Dorpat, 29.39, a fall of 0.29 inch., WSW., cloudy; over the Baltic and to the southward the winds shifted to northwesterly, with rising barometer and cloudy or partly weather, with occasional rain. 4th, central area greatly enlarged, a trough of low-pressure running from the Black Sea northeastward to the Artic ocean; lowest barometers at Archangel, 29.34, and Moscow, 29.39. 5th, central near 60° N., 50° E.; Kasan, 29.40, a fall of 0.25 inch, SW., snow; Ekaterinburg, 29.72, a fall of 0.35 inch, SSE., cloudy; Krotkowo, 29.50, a fall of 0.30 inch,W., cloudy. 6th, Ekaterinburg, 29.34, SSE., snow; Kasan, 29.74, W., cloudy; Krotkowo, 29.86, NW., cloudy. 7th and 8th, disappeared in an area of high-pressure (30.40) over central Siberia. No. V.—While area No. II covered central Russia on the 4th the present area appeared off the northwestern coast of Norway. On the 5th, the central depression occupied northern Scandinavia; Tromso, 29.22, a fall of 0.60 inch in past 24 hours, SW., rain; Brono, 29.38, a fall of 0.56 inch, SW., rain. On this day the isobar of 29.80 covered Scandinavia and more than two-thirds of Russia, running southeastward into Toorkistan. 6th, central over the Gulf of Finland, with the area of precipitation extending southwestward to France and south to Turkey; St. Petersburg, 29.48, SE., light snow; Dorpat, 29.34, ESE., light snow; Wilna, 29.48, SW., fair. 7th, central east of the White sea, with greatly diminished energy; Archangel, 29.78, a rise of 0.13 inch, wind WSW. The rapid advance of a high-pressure area (30.40) over Toorkistan and southwestern Siberia caused the disappearance of this depression on the 8th. No. IX.—This area succeeded No. V very rapidly, appearing over northern Norway, while the latter was yet central near the White sea. 7th, Tromso, 29.41, a fall of 0.19 inch in past 24 hours, NE., rain; Haparanda, 29.71, E., snow; Brono, 29.49, a fall of 0.11 inch, WNW., rain. 8th, central southwest of the White sea; Archangel, 29.15, a fall of 0.63 inch in past 24 hours, ESE., cloudy; St. Petersburg, 29.30, a fall of 0.56 inch, NW., light rain. 9th, central near 60° N., 50° E.; Kasan, 29.41, a fall of 0.75 inch in past 24 hours, S., cloudy; Krotkowo, 29.50, a fall of 0.80 inch, SW., cloudy. 10th, central over the Ural Mountains in the vicinity of 55° N.; Ekaterinburg, 29.39, a fall of 0.48 inch, calm, cloudy. 11th, central in the Province of Yeniseisk, but with greatly diminished energy, finally disappearing on the following day over northern Siberia. Yeniseisk reported a fall of 0.11 inch on the 11th, wind shifting from E. to ESE., with heavy snow. No. XI.—While area No. I was central on the 11th over the White sea and before a complete recovery of pressure over Scandinavia the barometer fell with considerable suddenness over the Islands north of Scotland; Thorshavn, 29.42, a fall of 0.39 inch, NE., force 6 cloudy; North Unst, 29.50, a fall of 0.33 inch, S., cloudy; Sandwick Manse, 29.34, a fall of 0.69 inch, SW., cloudy. During the day depression

passed southeastward into Denmark, where it was central on the 12th; Copenhagen, 29.30, a fall of 0.56 inch, E., rain; Fanoe, 29.27, a fall of 0.57 inch, calm, rain; the isobar of 29.60 covered nearly the whole of central Europe; rain prevailed very generally over the German Empire and eastern France. 13th, central over eastern Russia; Königsburg, 29.38, a fall of 0.14 inch, SW., heavy snow; Memel, 29.35, a fall of 0.15 inch, N., cloudy; rain or snow, with brisk to high northwest winds and gales, prevailed throughout Prussia and Bavaria and a thunder-storm was reported from Munich. 14th, central in southwestern Russia with increased pressure; Wilna, 29.52, calm; Kieff, 29.51, NW.; over the Baltic and throughout Prussia and Bavaria north to west winds increasing to gales, with rain, sleet or snow, prevailed; at Berlin a hurricane was reported on the 13th and 14th. 15th, depression about stationary with conditions unchanged to the westward. 16th, depression moved northward to near the Baltic coast, centre rapidly filling up; the violent storms of wind, rain, sleet and snow still continued to the south and west, but by morning of the 17th clearing weather, with winds shifting to east and south and rapidly rising pressure, prevailed. Depression on this day situated north of the Black sea; Nikolaiev, 29.72, S., rain; Kieff, 29.79, NE., cloudy, huge piles of drifting snow. During the day the depression disappeared in a high pressure area (30.60) prevailing in the vicinity of the Caspian sea. The peculiar movement of this area from the 13th to the 16th inclusive was probably due to the persistancy of an area of high pressure over central and eastern Russia, which condition was not relieved until the 16th, when an area of 30.40 appeared over France moving northeastward, while at the same time No. IV covered the ocean between Iceland and Norway. No. XXI.—This area may have been a continuation of No. IV which was lost sight of off the northern coast of Norway during the 18th, owing to the rapid advance northward of an area 30.60 over northern Europe. Perhaps the depression remained intact north of the 70th parallel, beyond which latitude we have no data, and put in an appearance on the 20th, in northwestern Siberia. 20th, Barnaul, 29.81, a fall of 0.79 inch in past 24 hours, SW., snow; Yeniseisk, 29.70, a fall of 0.52 inch, SW. snow. 21st, depression moving southeastward; Yeniseisk, 29.43, SW., snow; Barnaul, 29.52, SW., snow. 22d, Yeniseisk, 29.74, W., snow; Barnaul, 29.45, NW., snow. 23d Yeniseisk, 30.24, SSW., fair; Barnaul, 30.47, W., clear. During the 22d depression disappeared over the Province of Irkoutsk in an area of high pressure (30.40) then prevailing in that region. No. XXVII.—Following the passage of area No. XVII over Scandinavia on the 22d the barometer again fell over the northern portion of this country developing a depression on the 25th which by the following morning embraced northern Europe between the parallels of 60° and 70° N., and the meridians of 40° and 16° E.; lowest pressure at Haparanda, 29.78, NE.; Archangel, 29.82, ENE.; St. Petersburg, 29.83, SW., snow. On the morning of the 26th a small area of 29.80, with snow, appeared just north of the Black sea, which during the day merged with area No. XXVII forming a barometric trough extending southwestward from the White sea and including the whole of central Russia. By morning of the 27th, this extended depression contracted to small area of 29.40 situated in about 50° N., 30° E.; Kieff, 29.37, a fall of 0.43 inch, NNE., snow and fog; Nikolaiev, 29.39, a fall of 0.44 inch, NW., rain. During the day the depression curved to the northeast and with greatly diminished pressure was central, morning of the 28th, in central Russia; Kasan, 28.97, a fall of 0.94 inch, SE., snow; Moscow, 29.13, a fall of 0.63 inch, SE., cloudy; Archangel, 29.76, a fall of 0.17 inch, ENE., cloudy; St. Petersburg, 29.47, a fall of 0.09 inch, NW., light snow. 29th, central in northeastern Russia; Archangel, 29.51, NNE., cloudy; Kasan, 29.48, WSW., cloudy; Ekaterinburg, 29.24, a fall of 0.80 inch, SW., light snow: Moscow, 29.56, S., light snow. During the day depression passed eastward to the valley of the Obi where it was central on the morning of the 30th, disappearing thereafter over northern Siberia in an area of high pressure, 30.20. No. XXVIII.—This area developed during the 24th and 25th over the Mediterranean south of France, pressure generally below 29.85 with cloudy weather, easterly winds and rain along the southern coast of France and the western coast of Italy. 26th, the isobar of 29.80 embraced the whole of southern Europe between the parallels of 38° and 46° N., and thence westward over the Atlantic to 35° W. This extended depression embraced two smaller areas, one 29.40 (area No. XXIV) and the other 29.70 (area No. XXVIII) the latter occupying the Mediterranean in the vicinity of Sardinia. During the 27th and 28th the depression moved southeastward off the western coast of Italy and was finally lost sight of through the influence of advancing area No. XXIV central on the 28th off the eastern coast of Spain. Of the storms off the Asiatic coast the following descriptions are given: No. III.—During the 1st the barometer along the southeastern coast of the Island of Nippon fell from 0.10 to 0.20 inch developing on the 2nd a depression which moved northeastward with comparatively slight energy; no violence was effected at land stations; 2d, in 38°, 47′ N., 148°, 27′ E., 29.92, NW., rough sea, cloudy; 3d, in 40°, 27′ N., 152°, 19′ E., variable winds, rough sea, rain. 4th, in 42°, 01′ N., 156°, 36′ E., 29.70, NW., rough weather, cross seas, rain. 5th, in 43°, 15′ N., 161° 48′ E., 29.75, rough weather, cross seas, NW., hail; in 31°, 12′ N., 174°, 08′ W., 30.12, SW., moderate sea, cloudy. 6th, in 44°, 20′ N., 167°, 19′ E., moderate sea, NW., cloudy; in 31°, 12′ N., 179°, 88′ W., 30.06, SW., moderate sea, showery. 7th, in 45°, 04′ N., 172°, 09′ E., 29.85, N., moderate sea, hail; in 31°, 05′ N., 175°, 23′ W., 29.81, heavy SW. squalls, tremendous sea. On the 8th the depression disappeared in an area of high pressure (30.30) with clearing weather and easterly winds. No. VII.—This area formed

over the China sea during the 5th and 6th; on the latter date barometer at Hong Kong read 29.99, a fall of 0.13 inch in past 24 hours, wind shifted from NE. to N., with rain; Manilla, Phillippine Islands, 29.83, a rise of 0.08 inch, wind shifted from SSW. to SE., followed by rain. 7th, Manilla, 29.76, SE.,cloudy; to the northward along the Japan Islands the winds were northeasterly with falling barometer and cloudy or threatening weather. 8th, Manilla, 29.75, NNW., cloudy, 1.15 inches rain-fall in past 24 hours; Zi-Ka-Wei, 30.32, rain, wind NNW.; pressure rapidly falling along the southern coast of the Japan Islands. 9th, Manilla, 29.67, SW., rain; Nagasaki, 29.87, a fall of 0.27 inch in past 24 hours; Wakayama, 29.72, a fall of 0.41 inch, ENE., rain; Tokei, 29.78, a fall of 0.20 inch, NNE., rain; in 37°, 10′ N., 148°, 24′ E., 29.76, NNW., fair. 10th, Nasaki, 29.96, N., clear; Manilla, 29.78, E.,clear; Wakayama, 29.70, N., fair; Tokei, 29.54, NNE., rain; in 37°, 28′ N., 148°, 35′ E., 29.98, NNE., heavy sea, rain. 11th, depression passed to the eastward, followed over the Japan Islands by clearing weather, rapidly rising pressure and winds shifting to east and northeast; in 38°, N., 148°, 50′ E., 29.89, NNW., heavy sea, fair; in 30°, 59′ N., 158°, 02′ E., 29.75, W., heavy squalls. On the 12th disappeared to the eastward in an area of high pressure. No. XV.—This area suddenly appeared in the vicinity of 30° N., 150° E., developing on the 14th a depression inclosed by the isobar of 29.60; in 39°, 05′ N., 153°, 15′ E., 29.47, a fall of 0.78 inch in past 24 hours, NW., clear; in 33°, 19′ N., 144°, 23′ E., 29,74, N., heavy squalls. During this day and the following the depression moved rapidly northeastward, and by morning of the 16th was lost in an area of high pressure (30.30) in the vicinity of 35° N., 165° E. No. XIX.—This depression developed over the China sea during the 17th and 18th, and moved northeastward south of the Japan Islands, disappearing on the 22d in the vicinity of 35° N., 165° E. Rain with northeasterly winds and the barometer generally above 29.90 prevailed during the 19th and 20th along the Japan coast; the depression was too far south to produce a decided effect along this coast. The following observations show the influence of the storm at Manilla, Phillippine Islands: 18th, 29.84, NE., fair; 19th, 29.69 N., cloudy; 20th, 29.57 S., stormy, 4.50 inches rain-fall in past twenty-fours; 21st, 29.81, SE., very cloudy. No. XXVI.—During the 22d and 23d this storm developed over the China Sea south of the 20th parallel; 22d, Macao, 29.81, a fall of 0.13 inch in past 24 hours, wind NE., 8 hours rainfall; Manilla, 29.83, SW., cloudy; in 24°, 59′ N., 119°, 25′ E., 29.89. NNE., cloudy. 23d, Macao, 29.84, NE., cloudy; Manilla, 29.84, N. cloudy; in 22°, 19° N., 115°, 16′ E., 29.78, WSW., cloudy. 24th, Hong Kong, 29.95, NW., fair; S. S. *Belgic*, Hong Kong, 29.86, W.,cloudy; Manilla, 29.83, SW., 1.39 inches rain-fall in past 24 hours. At Nagasaki and Zi-Ka-Wei the barometer fell from 0.04 to 0.12 inch, wind NE., light rain, but from Wakayama northeastward to Yokohama, there was a slight rise, winds shifted from SW. to E. and NE. 25th, at Manilla and Hong Kong winds shifted to N. and NW., with slowly rising pressure and clear or partly cloudy weather; over Japan rain was general with easterly winds and pressure about 30.00 except at Nagasaki where the barometer read 29.92. During the day depression shifted its course more to the east leaving the Japan Islands a greater distance to the north which caused a cessation of atmospheric disturbance in that region followed on the morning of the 26th by clear and clearing weather; slightly higher pressure prevailed from Nakasaki westward, and slightly lower northeastward to Yokohama. 27th, depression disappeared over the ocean in the vicinity of 30° N., 155′ E. Along the Japan coast the barometer rose from 0.10 to 0.25 inch; winds shifting to N. and NW. with clear or partly cloudy weather.

TEMPERATURE OF THE AIR.

The mean temperature of the air for October, 1881, is shown by the isothermal lines (in red) on chart No. II. The table of mean and comparative temperatures in the right hand corner of the chart shows, in the first column, the average for the month throughout the various districts, as deduced principally from observations taken at Signal Service stations. In the two remaining columns are shown the means for the present month, and the departures of such means from the average for many years. The temperature is everywhere above the normal east of a line running from the Rio Grande valley northeastward to Lake Superior. Within this extensive region of country the departures of excess range from 1°.3 in New England to 6°.5 in the Eastern Gulf states. Mount Washington shows a deficiency of 1°.1. Over the remainder of the country to the west the temperature is everywhere below the normal with but one exception, the Middle Rocky Mountain slope, where an excess of 5°.1 appears. The departures of deficiency range from 0°.8 in Minnesota to 6°.8 in the Northern Rocky Mountain slope. As a means of interesting comparison, the following maximum departures from the normal are given for each year since 1872, together with the corresponding districts: 1873, —5°.0 Upper Mississippi valley, and —4°.5 Minnesota; 1874, +3°.0 Minnesota, and +2°.9 Upper Mississippi valley; 1875, —4°.6 St. Lawrence valley, and —3°.7 South Atlantic states; 1876, —4°.0 Minnesota, and —4°.2 South Atlantic States; 1877, +4°.6 Lower Lake region; 1878, +4°.8 New England; 1879, +9°.4 Upper Mississippi valley and Minnesota; 1880, —4°.0 Rio Grande valley, and —3°.7 Southeast Rocky Mountain slope.

Ranges of Temperature at Signal Service Stations.—Monthly ranges in general varied from 35° to 50° over the country east of the Rocky Mountains and from 45° to 60° westward to the Pacific.

The *smallest* ranges were: Key West, 18°; Punta Rassa, 23°; Brownsville, 25°; San Diego and San Francisco, 27°; Galveston, 28°; New Orleans and Port Eads, 31°; Cedar Keys and Portland Or., 32°. The *largest* were: Ft. Assinnaboine, 74°; Eagle Rock and Campo, 69°; Ft. Benton, 67° Prescott, 65°; Winnemucca, 64°; Florence, Ariz., 62°; Forts Shaw and Buford, 61°. The *daily* ranges varied in the different districts as follows: New England, 21° at New Shoreham and Eastport, to 37° at Boston; Middle Atlantic states, 20° at Chincoteague to 28° at Atlantic City, Washington and Norfolk; South Atlantic states, 19° at Charleston to 28° at Augusta and 29° at Wilmington; Florida Peninsula, 14° at Key West to 19° at Cedar Keys; Eastern Gulf states, 19° at New Orleans to 26° at Montgomery; Western Gulf states, 16° at Galveston to 29° at Mason and 33° at San Antonio; Ohio valley and Tennessee, 24° at Cincinnati to 28° at Morgantown and Memphis, and 30° at Pittsburgh; Lower Lake region, 24° at Sandusky to 29° at Buffalo and 38° at Rochester; Upper Lake region, 23° at Escanaba to 31° at Duluth and 33° at Port Huron; Upper Mississippi valley, 21° at La Crosse to 29° at St. Paul and 30° at St. Louis; Missouri valley, 26° at Omaha to 42° at Yankton and Fort Bennett; extreme Northwest, 37° at Fort Stevenson to 43° at Bismarck; Northern Slope, 27° at Helena to 45° at North Platte and 47° at Deadwood; Middle Slope, 39° at Fort Elliott to 40° at Denver and Dodge city; Southern Slope, 27° at Jacksboro to 40° at Stockton and 47° at El Paso; Rio Grande valley, 24° at Edinburg to 44° at Uvalde; Northern Plateau, 28° at Lewiston to 39° at Boise City and 50° at Eagle Rock; Middle Plateau, 29° at Pioche to 32° at Salt Lake City and 55° at Winnemucca; Southern Plateau, 42° at Silver City to 44° at Tucson and 51° at Fort Verde; North Pacific coast, 19° at Portland to 27° at Olympia and 28° at Roseburg; Middle Pacific coast. 19° at San Francisco to 35° at Sacramento and Red Bluff; South Pacific coast, 23° at San Diego to 37° at Visalia, Los Angeles and Yuma, and 60° at Campo.

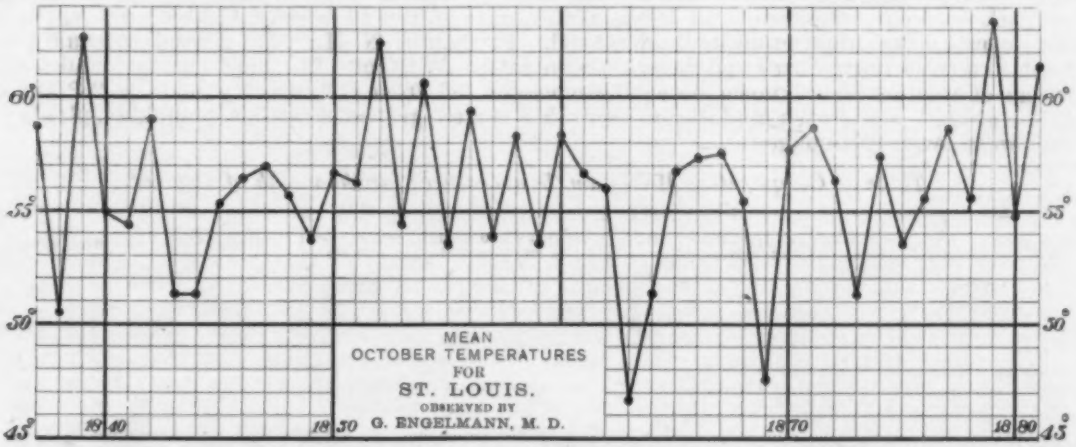
Table of Maximum and Minimum Temperatures for October, 1881.

State or Territory.	Signal Service.			U. S. Army Post Surgeons or Voluntary Observers.		
	Station.	Max.	Min.	Station.	Max.	Min.
Alabama	Montgomery	92°	49°	Auburn		44°
Arizona	Florence and					
Do	San Carlos	98°				
Do	Prescott		21°			
Arkansas	Little Rock	90°	44°			
California	Campo	80°	19°			
Do				Galt and		
Do				Ft. Yuma	100°	
Do				CampKellogg		15°
Colorado	Denver	82°	28°	Ft. Garland		15°
Connecticut	New Haven	86°	28°	Southington	86°	22°
Dakota	Ft. Sully	77°		Ft. Hale	81°	
Do	Ft. Buford		0°	Ft. Buford		5°
Delaware	Breakwater	84°	49°			
Dist. Columbia	Washington	92°	37°			
Florida	Key West	91°		Houston	95°	
Do	Punta Rassa		51°	Ft. Barrancas		45°
Georgia	Augusta	90°	45°	Forsyth	93°	
Do	Atlanta		48°	McPherson Barracks		45°
Idaho	Eagle Rock	78°	9°			
Illinois	Cairo	88		Anna	90°	
Do	Champaign		39°	Elmira		29°
Indiana	Indianapolis	81°	39°	Laconia	86°	35°
Do				Vevay	86°	
Indian Ty	Ft. Supply	103	24°			
Iowa	Des Moines	83°	32	Des Moines,		
Do				Ft. Madison &		
Do				Logan	86°	
Do				Cresco		26°
Kansas	Dodge City	89°	29°	Wellington	95°	
Do				Ft. Wallace		11°
Kentucky	Louisville	87°	43°			
Louisiana	Shreveport	94°	47°			
Maine	Portland	83°		Cornish and		
Do	Eastport		24°	Dexter		22°
Maryland	Baltimore	89°	39°	Fallston and		
Do				Federalsburg	90	
Do				Woodstock		28°
Massachusetts	Boston	90°	28°	Heath		20°
Michigan	Port Huron	79°		Ft. Brady		20°
Do	Escanaba		25°			
Minnesota	St. Paul	72°				
Do	Moorehead		17°	Ft. Snelling	75°	

State or Territory.	Signal Service.			U. S. Army Post Surgeons or Voluntary Observers		
	Station.	Max.	Min.	Station.	Max.	Min.
Mississippi	Vicksburg	90°	43°			
Missouri	St. Louis	88°	43°	Neosho	95°	
Do				Sedalia		29°
Montana	Ft. Keogh	73°		Ft. Assinnaboine		−17
Do	Ft. Assinnaboine		−16°			
Nebraska	Omaha	83°		Clear Creek	89°	
Do	North Platte		25°			
Nevada	Winnemucca	75°	11°	Carson City	78°	
New Hampshire	Mt. Wash'ton	54°	−3°	Auburn	88°	
New Jersey	Sandy Hook	87°		Vineland	92°	
Do	Atlantic City		33°	Atco		27°
New Mexico	La Mesilla	92°		Fort Union		18°
Do	Ft. Bayard &					
Do	Silver City		30°			
New York	N. York City	88°		West Point	93°	
Do	Buffalo		29°	Madison Barracks		17°
North Carolina	Hatteras and			Weldon	92°	33°
Do	Kittyhawk	90°				
Do	Charlotte		42°			
Ohio	Cincinnati &			Jacksonburg&		
Do	Columbus	84°		Portsmouth	96°	
Do	Toledo		35°	Westerville		32°
Oregon	Umatilla	69°	21°			
Pennsylvania	Pittsburg	89°	35°	Milton	95°	
Do				Dyberry		20°
Rhode Island	Newport	78°	34°	Fort Adams	81°	31°
South Carolina	Charleston	86°	54°	Aiken		45°
Tennessee	Memphis	89°				
Do	Nashville	89°	43°			
Texas	Edinburg	94°				
Do	Ft. Elliott		33°			
Utah	Salt Lake City	82°	25°	Coalville		13°
Vermont	Burlington	74°	23°	Woodstock	83°	17°
Virginia	Cape Henry&			Accotink	91°	
Do	Norfolk	89°		Snowville		31°
Do	Chincoteague		4.°			
Washington Ty	Almota	72°				
Do	Dayton		19°			
West Virginia	Morgantown	84°	30°	Flemington	89°	29°
Wisconsin	Madison	77°	33°	Edgerton	82°	
Do				Neillsville		24°
Wyoming	Cheyenne	76°	18°	Ft. Bridger	78°	−3°

Deviations from Mean Temperature.—Under this heading departures exhibited by reports from the regular Signal Service stations are shown in the table of comparative temperatures on the right-hand side of chart No. II. The following items of importance in connection with this subject are reported by voluntary observers: *Illinois:* Riley, mean temperature 4°.7 above that of past 20 years; October, 1879, was the only month with a higher mean temperature; the minimum temperature for each October during the past 20 years has been lower than that of the present year and the monthly range for the present month is the smallest for the same period. *Maine:* Gardiner,

mean temperature 0°.24 below the average for the past 45 years. *Maryland:* Fallston, mean temperature considerably above the average for the past 10 years. Sandy Springs, warmest October for past 15 years. *Missouri:* St. Louis, the Missouri Weather Service reports: mean tempera-



ture 5° above the average of the past 45 years; this mean has been exceeded but three times since 1837; highest, 62°.8, occurred in 1839; lowest, 46°.7, occurred in 1863. *New Hampshire:* Contoocookville, mean temperature 1° above the average for past 11 years. *New York:* Waterburg, mean temperature considerably above the average for the past 10 years; highest mean temperature during this period occurred in 1879. Palermo, mean temperature 0°.4 above the average for the past 28 years. North Volney, mean temperature 2°.6 above the average for past 13 years; highest monthly mean during that period, 55°.5 occurred in 1879; lowest, 44°.7 occurred in 1876. *West Virginia:* Flemington, mean temperature 8° above the mean for October, 1880. *Virginia:* Wytheville, mean temperature 4°.7 above the average or the past 17 years.

Frosts.—In the various districts they were reported on the following dates: New England, 3d to 7th, 9th to 12th, 14th, 20th to 22d, 26th to 29th; Middle Atlantic states, 5th, 6th, 7th, 11th, 12th, 14th, 19th to 23d, 26th to 28th; South Atlantic states, 6th, 7th, 9th, 11th, 12th, 21st, 22d, 26th, 27th; East Gulf states, 26th; West Gulf states, 19th, 22d, 27th; Ohio valley and Tennessee, 5th, 6th, 11th, 14th, 15th, 17th to 23d, 25th to 27th; Lower Lake region, 5th, 6th, 7th, 10th, 11th, 14th, 19th, 20th, 21st, 26th to 28th; Upper Lake region, 1st, 2d, 4th to 6th; 9th to 11th, 13th, 14th, 16th to 28th, 31st; extreme Northwest, 1st to 5th, 8th, 9th, 11th to 27th, 30th; Upper Mississippi valley, 5th, 9th, 10th, 13th, 16th, 18th to 22d, 24th to 26th; Missouri valley, 8th, 9th, 13th, 15th to 21st, 23d to 26th, 30th; Northern Slope, 1st, 2d, 4th to 31st; Middle Slope, 16th to 20th, 24th, 25th, 28th, 30th; Southern Slope, 20th, 25th, 30th; Southern Plateau, 11th, 12th, 14th to 18th, 21st to 24th, 28th to 31st; Middle Plateau, 4th to 10th, 12th to 18th, 21st to 31st; Northern Plateau, 1st to 6th, 7th to 10th, 12th to 14th, 22d to 26th; North Pacific region, 1st, 3d, 11th to 14th, 21st, 24th; Middle Pacific region, 13th to 17th; South Pacific region, 3d, 6th to 8th, 14th to 23d, 31st. The following notes in reference to severe and damaging frosts have been reported: Lynchburg, Va., 6th, light frost of this morning was unprepared for; irreparable damage done to the tobacco crop standing in the fields. Southington, Conn., 6th, temperature fell to 22°; great damage done the cabbage crop; pears were frozen on the trees; the change came so suddenly that no preparation was made for it. Westborough, Mass., 5th, great destruction of vegetables and flowers. Worcester, Mass, 5th, vegetation killed. Thornville, Mich., 11th, destructive to vegetation. Johnsontown, Va., 6th, vines killed. Newport, Vt., 5th, apples frozen on the trees; great destruction of fall feed and late crops. Derby Line, Vt., 5th, ground frozen hard; much injury to grapes and other fruit. Stowe, Vt., 5th, all fruit frozen on the trees. Orleans county, Vt., 5th, many large orchards nearly ruined; large loss in apples and vegetables. Lemoore, Cal., 21st, during past week very severe frosts; fig trees, oleanders and even chrysanthemums were badly damaged; a great many house plants killed. Little Metis, Province of Quebec, 28th, grain and potatoes suffered severely. Winthrop, Mass., 6th, immense damage to crops in surrounding country; grapes completely destroyed and apples nearly so; the damage in the county to apples alone is estimated at $25,000; late corn, pumpkins and squash were badly injured. Raleigh, N. C., 6th, tobacco crop in this section badly injured. Plummersville, N. C., 6th, very heavy; much injury to crops. Bristol, Tenn., 22d, first of season; fences perfectly white for miles about; considerable injury to fruit and other crops. Danville, Va., 6th, tobacco severely injured. Richmond, Va., 6th, very general throughout the state, and doing incalculable damage, especially to the tobacco crop; at least one-half of the standing crop has been destroyed; in some portions of the State the condition is even worse; one farmer is reported to have lost 80,000 plants, while the joint loss of two others is estimated at what would fill sixty barns. South Carolina, 6th, in northern portions of State the late growth of cotton has been destroyed. Milford, N. H., 5th, squashes, grapes and vegetables badly

damaged; ground frozen. East Northwood, N. H., 5th, crops and fruit severely injured. Hanover, N. H., 5th, first of the season; ground frozen so hard that the crust would bear up a horse; late fruit severely injured. Portsmouth, N. H., 5th, great damage to fruits and gardens; Warner, N. H., 5th, fruit frozen on the trees and house plants were frozen in-doors. Contoocook, N. H., 5th, fruit, squashes and other crops badly damaged. Plymouth, N. H., 5th, ground in some places frozen to a thick crust; fruit and vegetables injured. Wolfboro, 5th, most extreme and sudden change of weather ever known here; thermometer fell from 80° Monday noon to 28° Tuesday night; ground was frozen, and throughout this region grapes, squashes, pumpkins, plants and vines were severely damaged.

Table of Comparative Maximum Temperatures for the month of October.

State or Territory.	Maximum for October, 1881, Signal Service.		Highest since Signal Service stations were opened—3 to 10 years.			Highest from any other source.		
	Station.	Temp.	Station.	Temp.	Year.	Place.	Temp.	Length of Record.
Alabama	Montgomery	92°	Mobile	90°	1879	Mount Vernon Arsenal	96°	31 years.
Arizona	Florence and San Carlos	98°	Stanwix	103°	1876	Fort McDowell	108°	14 "
Arkansas	Little Rock	90°	Little Rock	89°	1879	Fort Smith	91°	21 "
						Little Rock	90°	37 "
California	Campo	80°	Los Angeles	98°	1879	Fort Yuma	105°	30 "
Colorado	Denver	82°	Denver	85°	'76,'77	Fort Lyon	92°	19 "
Connecticut	New Haven	86°	New Haven and New London	83°	1879	Columbia	88°	9 "
						New Haven	83°	87 "
						Fort Trumbull	77°	47 "
Dakota	Ft. Sully	77°	Ft. Buford	95°	1879	Fort Buford	96°	8 "
Delaware	Delaware Breakwater	84°	Breakwater	78°	1880	Fort Delaware	88°	44 "
Dist. of Columbia	Washington	92°	Washington	92°	1879	Washington	99°	48 "
Florida	Key West	91°	Key West	91°	'75-'77	Fort King	98°	10 "
Georgia	Augusta	90°	Augusta	89°	1879	Augusta Arsenal	92°	48 "
Idaho	Eagle Rock	78°	Boise City	85°	'79,'80	Fort Boise	93°	16 "
Illinois	Cairo	88°	Springfield	88°	1879	Chicago	90°	47 "
						Manchester	90°	10 "
Indiana	Indianapolis	81°	Indianapolis	86°	1879	Vevay	96°	15 "
Indian Territory	Ft. Supply	90°	Fort Sill	91°	1878	Fort Sill	96°	10 "
						Fort Gibson	95°	32 "
Iowa	Des Moines	83°	Keokuk	87°	1879	Muscatine	87°	26 "
Kansas	Dodge City	89°	Leavenworth	89°	1874	Fort Larned	98°	14 "
						Fort Leavenworth	94°	40 "
Kentucky	Louisville	87°	Louisville	88°	1879	Chilesburg	88°	3 "
						Newport Barracks	85°	28 "
Louisiana	Shreveport	94°	Shreveport	90°	1878	New Orleans	96°	50 "
Maine	Portland	83°	Portland	83°	1879	Brunswick	88°	52 "
Maryland	Baltimore	89°	Baltimore	89°	1879	Fort Washington	92°	37 "
Massachusetts	Boston	90°	Boston	88°	1879	Topsfield	87°	6 "
Michigan	Port Huron	79°	Marquette	87°	1879	Monroe	89°	10 "
						Ontonagon	89°	11 "
Minnesota	St. Paul	72°	Breckenridge	89°	1879	Fort Snelling	90°	60 "
Mississippi	Vicksburg	90°	Vicksburg	91°	1879	Vicksburg	90°	4 "
						Columbus	89°	9 "
Missouri	St. Louis	85°	St. Louis	90°	1879	Allentown	100°	3 "
Montana	Ft. Keogh	73°	Ft. Custer	87°	1879	Fort Shaw	91°	7 "
Nebraska	Omaha	85°	North Platte	89°	1879	Fort McPherson	102°	14 "
Nevada	Winnemucca	75°	Winnemucca	84°	1879	Fort Ruby	101°	5 "
New Hampshire	Mount Washington	54°	Mount Washington	57°	'77,'79	Concord	80°	7 "
						Fort Constitution	79°	33 "
New Jersey	Sandy Hook	87°	Sandy Hook	89°	1879	Newark	83°	9 "
New Mexico	La Mesilla	92°	La Mesilla	90°	1879	Fort Cummings	106°	4 "
New York	New York City	88°	New York City	88°	1879	Poughkeepsie	95°	20 "
North Carolina	Hatteras and Kittyhawk	90°	Portsmouth	89°	1879	Fort Johnson	90°	54 "
Ohio	Cincinnati and Columbus	84°	Toledo	88°	1877	College Hill	90°	56 "
						Marietta	88°	53 "
Oregon	Umatilla	69°	Umatilla	86°	1880	Fort Dalles	100°	16 "
Pennsylvania	Pittsburg	89°	Pittsburg	91°	1879	Mount Joy	90°	9 "
						Philadelphia	88°	112 "
						Carlisle Barracks	89°	34 "
Rhode Island	Newport	78°	Newport	81°	1879	Providence	85°	35 "
South Carolina	Charleston	89°	Charleston	87°	1879	Charleston	89°	104 "
						Fort Moultrie	88°	27 "
Tennessee	Memphis and Nashville	89°	Knoxville	96°	1879	Glenwood Cottage	88°	10 "
Texas	Edinburgh	94°	Rio Grande and Uvalde	105°	1877	Fort McIntosh	104°	25 "
Utah	Salt Lake City	82°	Salt Lake City	83°	1876	Fort Douglas	99°	18 "
Vermont	Burlington	74°	Burlington	78°	1879	Lunenburg	83°	5 "
Virginia	Cape Henry and Norfolk	89°	Ft. Whipple	99°	1879	Fortress Monroe	89°	54 "
Washington Ty.	Almota	72°	Dayton	92°	1880	Fort Walla Walla	88°	10 "
West Virginia	Morgantown	84°	Morgantown	83°	1879	Helvetia	86°	4 "
Wisconsin	Madison	77°	La Crosse and Madison	84°	1879	Fort Crawford	86°	25 "
						Fort Howard	84°	30 "
Wyoming	Cheyenne	76°	Cheyenne	80°	'74,'7[illegible]	Fort Laramie	90°	26 "

Ice.—The following stations report its formation: Princeton, Oakland and Alameda, Cal., 14th. Roseburg, Or., 14th. Boise City, Idaho, 7th, $\frac{1}{8}$ inch; 13th. Prescott, Ariz., 15th, 17th, to 20th, 22d, 30th. Deadwood, Dak., 14th, $\frac{1}{4}$ inch; 15th, $\frac{3}{4}$ inch; 16th, 17th. Cheyenne, Wyo., 12th, 13th, 14th. Ft. Buford, Dak., 4th. Huron, Dak., 12th. Yankton, Dak., 12th, 13th. St. Paul, Minn., 5th. Duluth, Minn., 13th. Oswego, 5th. Flushing and Port Jervis, N. Y., 5th. Poughkeepsie, N. Y., 5th, $\frac{1}{2}$ inch. Ardenia, N. Y., 5th, 6th, $\frac{1}{8}$ inch. Buffalo, 5th. Rochester, 27th. Bangor, Me., 5th, on quiet pools from 2 to 3 inches; 26th. Wood's Holl, Mass., 5th. Thatchers Island, Mass., 2d. Cambridge, Mass., 10th, 11th, 26th, 27th. Rowe, Mass. 5th, $\frac{1}{4}$ to

$\frac{1}{2}$ inch; 6th, 11th. Springfield, Mass., 5th, 6th. New London, 5th, 6th. Boston, 27th. Burlington, Vt., 14th, 26th. New Haven, 5th. Wabash, Ind., 5th. Nora Springs, Ia., 20th. Clay Centre, Kan., 18th, $\frac{1}{8}$ inch. Orono, Me., 5th, $\frac{1}{4}$ inch. Dexter, Me., 5th. Fallston, Md., 6th, thin film. Litchfield, Mich., 19th. Niles, Mich., 19th. Thornville, Mich., 24th. Clear Creek, Neb., 13th, 20th. Genoa, Neb., 13th, 18th, 24th. Howard, Neb., 18th, $\frac{1}{4}$ inch. Grafton, N. H., 5th, $\frac{1}{2}$ inch. Contoocookville, N. H., 5th, $\frac{1}{2}$ inch. Ruggles, Ohio, 11th. Charlotte, Vt., 5th, 27th. Accotink, Va., 6th. Johnsonville, Va., 6th. Derby Line, Vt., 5th, $\frac{1}{4}$ inch. Newport, Vt., 5th, $\frac{1}{2}$ inch. Stowe, Vt., 5th, $\frac{1}{4}$ to $\frac{1}{2}$ inch. Milford, N. H., 5th, $\frac{3}{4}$ inch. Warner, N. H., 5th, $\frac{1}{2}$ inch. Plymouth, N. H., 5th, $\frac{1}{4}$ to $\frac{1}{2}$ inch. Bradford, Pa., 5th, 1 inch. London, Province of Ontario, 5th, $\frac{1}{4}$ inch. British Columbia, 14th; cold weather has been very severe for several days; ice formed every night.

PRECIPITATION.

The general distribution of rain-fall for the month of October, 1881, is shown on chart No. III from the reports of over 500 stations. From the table in the left-hand corner of the chart is obtained a monthly average for each of the various districts, determined from the records (covering a period of many years) of Signal Service stations, and also a comparison of the present month with such averages. Upon examining the chart a decided excess in the monthly rain-fall is found to prevail over the central portion of the country, the departures ranging from 0.22 inch in the Eastern Gulf states to 4.52 inches in the Upper Mississippi valley. The area of deficiency is confined to the Atlantic coast and except a slight excess in the Middle Atlantic states prevails from the Canadian Maritime Provinces southwestward to include Florida, the departures ranging from 0.90 inch in New England to 4.00 inches in the Florida Peninsula. On Mt. Washington there appears to be a very large excess, the total monthly rain-fall measuring 18.38 inches. On the Pacific coast a comparison with the average shows a range of from normal in the South Pacific region to +1.68 inches in the North Pacific region. As a means of interesting comparison, the following maximum departures from the average are given for each year since 1872, together with the corresponding districts: 1873, large excess, New England and Middle Atlantic states; 1874, —3.85 inches, Western Gulf states and —3.10 inches, New England; 1875, —1.40 inches, Lower Missouri valley and Middle Atlantic states, and +1.30 inches, North Pacific region; 1876, +5.15 inches, South Atlantic states and —2.35 inches New England; 1877, +5.88 inches Western Gulf states; 1878, +2.35 inches, Minnesota; 1879, +3.18 inches, Eastern Gulf States; 1880, +3.36 inches, Florida Peninsula.

Deviations from Average Precipitation.—Under this heading departures exhibited by the reports from the regular Signal Service stations are shown in the table of comparative monthly rain-fall in the lower left-hand corner of chart No. III. The following items of importance in connection with this subject are reported by voluntary observers: *Connecticut:* Southington, monthly rain-fall considerably below the average for the past 11 years. *Indiana:* Wabash, monthly rain-fall double the average of several years past. *Illinois:* Riley, monthly rain-fall 4.53 inches above the average for the past 20 years and 0.24 inch greater than the largest rain-fall during that period. *Maine:* Gardiner, monthly rain-fall 1.90 below the average for the past 45 years. *Missouri:* St. Louis, Missouri Weather Service reports monthly rain-fall considerably above the average for the past 45 years. *New Hampshire:* Contoocookville, monthly rain-fall about 1.50 inches below the October average for the past 11 years. *New York:* Palermo, monthly rain-fall equals the normal or the average of the past 28 years. North Volney, monthly rain-fall 0.12 above the average of the past 9 years. *West Virginia:* Flemington, monthly rain-fall considerably less than the average and 1.00 inch less than that of October, 1880.

Special Heavy Rains.—1st, Mt. Ida, Ark., 2.00 inches in 6 hours and 50 minutes; Franklin, Ark., 3.48; Denison, Tex., 2.82; Eagle Pass, Tex., 3.18; Lexington, Mo., 3.83; Ft. Smith, Ark., 3.75. 1st and 2nd, Pierce City, Mo., 4.50; Brackettville, Tex., 13.08, of which 10.97 fell in 8 hours. 2d, Blooming Grove, Penn., 2.90; Toledo, 3.10 in 12 hours; Ft. Scott, Kansas, 1.80 in 20 minutes. 2d and 3d, Springfield, Ill., 5.74. 4th, Vevay, Ind., 1.20, in 40 minutes. 4th and 5th, Yates Centre, Kan., 2.40, during late night and early morning. 6th, Swanwick, Ill., 2.25, in 1 hour and 45 minutes. 6th and 7th, Manitowoc, Wis., 3.30. 8th, Laredo, Tex., 3.53. 9th, Anna, Ill., 3.20; Ft. Davis, Tex., 2.82. 11th, Northfield, Minn., 2.84. 11th and 12th, Neillsville, Wis., 3.20. 12th, St. Joseph, Mo., 3.63. 15th, Mt. Washington, 2.87. 16th and 17th, Nora Springs, Ia., 3.00. 17th, Charleston, Ill., 2.50; Grand Haven, 3.04; St. Joseph, Mo., 3.60. 18th, Eastport, Me., 2.76. 20th and 21st, Mayport, Fla., 3.41. 23d, Pensacola, Fla., 2.65; Galveston, 2.96. 24th and 25th, Brownsville, Tex., 3.35. 27th, Shreveport, 3.80. 27th and 28th, Vicksburg, 6.59; Fayette, Miss., 6.20. 28th, Charleston, Ill., 2.50. 29th and 30th, Highlands, N. C., 8.27. 30th and 31st, Emmittsburg, Md., 3.52.

Largest Monthly Rain-falls.—Mt. Washington, N. H., 18.38 inches; Brackettville, Tex., 16.17; New Ulm, Tex., 12.44; Nora Springs, Ia., 11.70; Kirksville, Mo., 11.30; St. Joseph, Mo., 11.24; Highlands, N. C., 10.83; Hannibal, Mo., 10.70; Edinburg, Tex., 10.54; Galveston, 10.33; Alpena, Mich., 10.25; Northport, Mich., 10.19; Springfield, Ill., 10.02; Vicksburg, 9.69; Madison, Wis., 9.10; Louisiana, Mo., 8.95; Macon, Mo., 8.88; Manitowoc, Wis., 8.81; Fayette, Miss., 8.80;

Emmittsburg, Md., 8.77; Embarrass, Wis., 8.75; Columbus, O., 8.64; Neillsville, Wis., 8.60; Carthage, Mo., 8.55; Yates Centre, Kan., 8.52; Toledo, 8.49: Ft. Smith, Ark., 8.41; Shelbina, Mo., 8.40; Greenfield, Mo., 8.30; Shreveport, 8.28; Olympia, Wash. T., 8.18; Pierce City, Mo., 8.10; Cresco, Ia., 8.06; Keokuk, 8.01; Geneseo, Ill., 7.90; Grand Haven, 7.87; Neosho, Mo., 7.68; LaCrosse, 7.56; Litchfield, Mich. and Mt. Ida, Ark., 7.45; Niles, Mich., 7.41; Bolivar, Mo., and Coldwater, Mich., 7.40; Buffalo, 7.33; New Corydon, Ind., 7.31; Charleston, Ill. and O'Fallon, Mo., 7.30; Little Mountain, O., Monticello, Ia. and St. Louis, 7.21; Vevay, Ind., 7.20; Battle Creek, Mich., 7.17; Ft. Brown, Tex., 7.04; Muscatine, Ia., 7.03; Albany, Or., 7.00;

Smallest Monthly Rain-falls.—Wilcox, Ariz., Chico and Pajaro, Cal., Browns, Reno and Wells, Nev., and Kelton, Utah, none; Casa Grande and Yuma, Ariz., and Mojave, Cal., trace; Byron, Cal., 0.04 inch; Stockton, Cal., 0.05; Solidad, Cal., 0.07; Hot Springs, Nev., 0.08; Wickenburg, Ariz., 0.09; Camp Kellogg, Sumner and Tehachapi, Cal., Ft. Lincoln, Dak., and Boca, Nev., 0.10; Tracy, Cal., 0.15; Carson City, Nev., 0.17; Humboldt, Nev., 0.18; Benecia Barracks and Goshen, Cal., 0.19; Ft. Verde, Ariz., and Hollister, Cal., 0.20; Keene, Cal., 0.21; Tulare, Cal., 0.22; San Diego, Cal., 0.24; Modesto and Oakland, Cal., Flemington, N. J., and Phœnix, Ariz., 0.25; Mammoth Tank, Cal., 0.26; Davis and Salinas City, Cal., and Ft. Brooke Tampa, Fla., 0.28; Visalia, Cal., 0.31; Denver, 0.32; Prescott, Ariz., 0.33; Borden, Cal., and Benson, Ariz., 0.34; Merced and Spadra, Cal., and Ft. Wallace, Kan., 0.35; Fresno, Menlo Park, and Pt. San Jose, Cal., 0.36; Woodland, Cal., 0.37; Dunnigan and Niles, Cal., 0.38; Ft. Buford, Dak., and Galt, Cal., 0.39; South Valejo, Cal., and Toano, Nev., 0.40; Rio Vista, Cal., 0.41; Farmington, Cal., 0.44; Brighton, Cal., 0.45; Ft. Keogh, Mont., and Gilroy, Cal., 0.46; Willows, Cal., 0.47; Carlin, Nev., and Terrace, Utah, 0.48; Ione, Cal., and Coalville, Utah, 0.50.

Rainy Days.—The number varied in New England from 10 to 22; Middle Atlantic states, 7 to 17; South Atlantic states, 7 to 17; Florida Peninsula, 7 to 17; East Gulf states, 8 to 15; West Gulf states, 11 to 21; Rio Grande valley, 6 to 19; Ohio valley and Tennessee, 7 to 20; Lower Lake region, 18 to 21; Upper Lake region, 14 to 20; extreme Northwest, 7 to 14; Upper Mississippi valley, 9 to 20; Missouri valley, 8 to 16; Northern Slope, 5 to 13; Middle Slope, 3 to 12; Southern Slope, 6 to 13; Southern Plateau, 4 to 10; Middle Plateau, 4 to 9; Northern Plateau, 9 to 17; North Pacific region, 17 to 19; Middle Pacific region, 7 to 8; South Pacific region, 1 to 4.

Cloudy Days.—The number varied in New England from 6 to 17; Middle Atlantic states, 4 to 12; South Atlantic states, 5 to 9; Florida Peninsula, 0 to 4; East Gulf states, 6 to 10; West Gulf states, 3 to 14; Rio Grande valley, 8 to 15; Ohio valley and Tennessee, 7 to 14; Lower Lake region, 13 to 16; Upper Lake region, 12 to 18; extreme Northwest, 10 to 13; Upper Mississippi valley, 7 to 16; Missouri valley, 9 to 15; Northern Slope, 2 to 13; Middle Slope, 6 to 9; Southern Slope, 0 to 9; Southern Plateau, 1 to 4; Middle Plateau, 1 to 6; Northern Plateau, 4 to 19; North Pacific region, 12 to 18; Middle Pacific region, 1 to 3; South Pacific region, 0 to 4.

Snow.—The dates on which snow fell are most numerous in Dakota, Montana, Idaho and Wyoming territories, as follows: *Dakota:* 9th, 11th, 12th, 14th, 15th, 18th, 19th, 22d, 23d, 31st. *Montana:* 9th to 19th, 29th to 31st. *Idaho:* 11th to 17th, 31st. *Wyoming:* 12th, 16th, 21st to 23d, 26th, 28th, 31st. In the other states and territories it was reported from various stations on the following dates: Burlington, Vt., 26th; Eastport, Me., 5th, 26th; Bangor, Me., 5th; Mt. Washington, N. H., 5th, 12th, 15th, 18th, 23d to 27th; Portland, Me., 5th; Nashville, Tenn, 25th; Marquette, Mich., 9th, 10th, 14th, 17th, 19th, 25th; Duluth, Minn., 19th; Moorehead, Minn., 14th, 15th; Denver, Col., 31st; Ft. Apache, Ariz., 24th, 26th; Ft. Bayard, N. M., 27th; Salt Lake City, 14th; Winnemucca, Nev., 11th, 13th, 15th, 20th, 31st; Pioche, Nev., 25th; Colfax, Wash. T., 11th., 15th; Umatilla, Or., 11th; Dayton, Wash. T., 11th, 12th; Pomeroy, Wash. T., 10th, 12th; Spangle, Wash. T., 11th, 15th, 16th, 17th; Olympia, Wash. T., 11th; Portland, Or., 14th; Red Bluff, Cal., 4th; Ft. Bidwell, Cal., 3d, 5th, 10th, 13th, 15th, 27th, 29th 31st; Ft. Lewis, Col., 24th, 26th, 28th, 31st; Pagosa Springs, Col., 24th, 26th, 31st; Ft. Brady, Mich., 9th, 14th, 17th; Ft. McDermitt, Nev., 12th, 27th, 30th; Ft. Wingate, N. M., 24th; Ft. Union, N., M., 29th, 31st; Plattsmouth Barracks, N. Y., 26th; Ft. Douglass, Utah, 13th, 20th, 28th; Franklin, Ark., 24th; Grafton, N. H., 5th; Charlotte, Vt., 26th; Lunenburg, Vt., 5th, 26th; Woodstock, Vt., 5th; New Tacoma, Wash. T., 14th; Newport, Vt., 5th; Stowe, Vt., 5th; Lewiston, Me., 5th; Wolboro, N. H., 5th; near Bradford, Pa., 5th; New Brunswick, 18th, in northern part of province fell to the depth of 10 inches; in Victoria and Restigouche counties 3 to 5 inches deep. Quebec, 18th, 8 inches fell during the night. Lawrence Co., N. Y., 10th, covering the ground. Chico, Cal., 13th; in the mountains first severe snow storm of the season; 12 inches fell on the Humboldt road. Salt Lake City, 20th, 21st, in mountains. Presque Isle, Me., 18th, fell to the depth of 9 inches.

Hail.—The usual diminution in the number of this class of storms as winter approaches is quite well marked for the month of October. Of the following small number reported, few were of any importance as regards severity: Winnemucca, 28th; Pioche, 25th; San Carlos, Ariz., 5th, 2 p. m. until 5.30 p. m., largest hail stones ever seen here; Ft. Lewis, Col., 6th, 24th; Holton, Kan., 14th; Clear Creek, Neb., 27th; De Soto, Neb., 16th; Albany, Or., 12th; Manitowoc, Wis., 6th.

RELATIVE HUMIDITY.

The percentage of mean relative humidity for the month ranges as follows: New England, from 70 to 88; Middle Atlantic states, 65 to 82; South Atlantic states, 69 to 81; East Gulf states, 72 to 80; West Gulf states, 73 to 82; Rio Grande valley, 73 to 86; Ohio valley and Tennessee, 71 to 80; Lower Lake region, 72 to 78; Upper Lake region, 70 to 82; extreme Northwest 67 to 75; Upper Mississippi valley, 69 to 81; Missouri valley, 73 to 76; Northern Slope, 54 to 79; Middle Slope, 49 to 76; Southern Slope, 57 to 78; Southern Plateau, 30 to 70; Middle Plateau, 38 to 56; Northern Plateau, 59 to 80; North Pacific region, 80 to 83; Middle Pacific region, 59 to 74; South Pacific region, 51 to 70.

WINDS.

The prevailing winds during the month of October, 1881, at Signal Service stations, are shown on Chart No. II, by arrows, which fly with the wind. In the South Atlantic and East Gulf states and in the Florida Peninsula, *northeasterly*, in the Middle Atlantic states and New England, *south* to *west* and *northwest*; in the Lake region, *southeast* to *southwest*; throughout the Mississippi and Ohio valleys and in Texas, *southerly*; in the Upper Missouri valley and the Rocky Mountain regions, *northerly;* in the Plateau regions and along the Pacific coast, *south* to *west*.

Total Movements of the Air.—The following are the largest total movements at Signal Service stations: Mt. Washington, 30,501 miles; Delaware Breakwater, 12,222; Portsmouth, N. C., 11,881; Wood's Holl, Mass., 11,463; Cape May, N. J., 11,256; Hatteras, N. C., 11,199; Kittyhawk, N. C., 11,094; Chincoteague, Va., 11,054; New Shoreham, R. I., 11,052; Port Eads, La., 10,358; Thatcher's Island, Mass., 10,176; North Platte, Neb., 9,839; Dodge City, Kan., 9,824; Indianola, Tex., 9,809; Sandy Hook, N. J., 9,727; Sandusky, Ohio, 9,257; Barnegat, N. J., 9,120; Ft. Sill, Ind., Ty., 9,084; Macon, N. C., 8,898; Cape Henry, Va., 8,659; Galveston, Tex., 8,575; Ft. Elliott, Tex., 8,498; Champaign, Ill., 8,263; Moorehead, Minn., 8,052. The *smallest* are: La Mesilla, N. M., 1,217; Lewiston, Idaho, 1,451; Lynchburg, 1,457; Silver City, N. M., 1,470; Uvalde, Tex., 1,743; Florence, Ariz., 1,778; Roseburg, Oreg., 1,915; Visalia, Cal., 2,285; Yuma, Ariz., 2,400; Laredo, Tex., 2,516; Dayton, Ohio, 2,587; Missoula, Mont., 2,677; Washington, D. C., 2,780; Tuscon, Ariz., 2,839; Memphis, Tenn., 2,846.

High Winds.—On summit of Mt. Washington a maximum velocity of 160 miles, *northwest*, was recorded on the 16th, and for five minutes, the register showed a velocity of 200 miles per hour. These are the highest velocities ever recorded at this station. Velocities of 100 miles per hour, and over, were recorded on the following dates: 5th, 15th, 16th, 26th, 27th. Stations reporting velocities exceeding 50 miles per hour, are as follows: Kitty Hawk, 60, NE., 5th; Portsmouth, N. C., 56, NE., 5th; Cape Henry, Va., 56, NW., 25th; Bismarck, Dak., 55, NW., 31st; North Platte, Neb., 54, S., 1st; Delaware Breakwater, 52, N., 5th; and Hatteras, N. C., 52, NE., 5th.

Local Storms.—The month of October is quite remarkable for the small number of this class of storms reported. Shawano, Wis., 8th, very violent storm, blowing down trees and fences and unroofing buildings; path of storm about one mile wide; for many miles acres of forest were perfectly leveled, and in many respects the storm's path appeared as if it had been swept by fire. Knox Co., Ohio, 2d, terrific wind storm swept over the country during the afternoon, demolishing outbuildings and fences and uprooting trees. Wantonio, Wis., 4th, terrible tornado swept down the valley of Wisconsin river, completely devastating a portion of the country 80 rods wide by about 6 miles in length; houses, barns, outbuildings and grist mills demolished. Rochester, N. Y., 17th, 8.30 p. m., tornado with funnel-shaped cloud passed over a small portion of the city, accompanied by a loud roaring noise; trees were uprooted and buildings damaged. Schuyler Co., Ill., 8th, terrific tornado, lasting five minutes, and leveling everything in its path; the village of Camden, containing several hundred inhabitants, had every house with the exception of two destroyed; loss to farmers in the vicinity, $15,000. Menominee Co., Mich., 8th, tornado passed over the upper waters of the north branch of Pike river, cutting a path through the forest two miles wide and 12 miles in length; hardly a tree was left standing in the path of the storm; it is estimated that 100,000,000 feet of pine was prostrated. Tallahassee, Fla., 28th, tornado passed over the town, unroofing buildings and causing much other damage; a heavy fall of hail accompanied the storm. Cheyenne, 12th, very heavy storm of sleet and wind, prostrating all overland telegraph lines and committing other damage.

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for October, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 84.3 per cent. The percentages for the four elements are: Weather, 88.7; Direction of the Wind, 79.2; Temperature, 86.4; Barometer, 82.9 per cent. By geographical districts they are: For New England, 85.1; Middle Atlantic states, 85.5; South Atlantic states, 87.2; Eastern Gulf states, 90.2; Western Gulf states, 87.8; Lower Lake region, 85.6; Upper Lake region, 81.3; Tennessee and the Ohio valley, 84.2; Upper Mississippi valley, 80.9; Lower

Missouri valley, 73.9; Northern Pacific coast region, 91.7; Central Pacific coast region, 94.7; Southern Pacific coast region, 100.0. There were 56 omissions to predict (40 being due to the absence of reports from the Pacific coast, out of 3,813, or 1.44 per cent. Of the 3,757 predictions that have been made, 192, or 5.11 per cent. are considered to have entirely failed; 157, or 4.18 per cent. were one-fourth verified; 374, or 9.96 per cent. were one-half verified; 363, or 9.66 per cent. were three-fourths verified; 2,671, or 71.09 per cent. were fully verified, so far as can be ascertained from the tri-daily reports.

Cautionary Signals.—231 Cautionary signals were displayed during the month of October, 1881, of which 178, or 77.05 per cent., were fully justified by winds of twenty-five miles per hour, or over, at, or within, a radius of 100 miles of the station. Thirty-one Off-shore signals were displayed, of which 22, or 70.97 per cent., were fully justified; 28 or 90.32 per cent., were justified as to direction; 22, or 70.97 per cent., were justified as to velocity, and 3, or 9.67 per cent., completely failed. Seven Off-shore signals, were changed to Cautionary. 262 signals, of all kinds, were displayed, of which 200, or 76.33 per cent., were fully justified. The above does not include signals ordered at display stations, where the velocity is only estimated. 74 winds, of 25 miles, or over, were reported, for which no signals were ordered. 51 signals were ordered late.

NAVIGATION.

Stage of Water in Rivers.—In the table on the right-hand side of chart No. III are given the highest and lowest stages of water, as observed at Signal Service stations during the month of October, 1881. The Red, Arkansas and Missouri rivers have remained at a moderate stage throughout the month, except that the latter at Yankton was extremely low. The Ohio, Cumberland, Tennessee, Monongahela, Savannah and Sacramento rivers were extremely low, particularly the first and last named. In the Mississippi a marked contrast with other large rivers appears; a very heavy rise began the second week of the month, resulting in a flood about the fourth week, which assumed very serious proportions, causing an immense loss of property between St. Paul and St. Louis.

Floods.—Illinois: Quincy, 20th, river 18 feet above low water mark and rising rapidly; water 8 inches higher than the great flood of last spring; all railroads submerged and travel suspended; on the Missouri side of the river, bottoms flooded back to the bluffs; river below city fully nine miles wide. 28th, river highest since 1851; nothing can now prevent a complete inundation. Farms for a distance of 25 miles along the bottoms on the Missouri side of the river were abandoned, perhaps never to be reclaimed, everything perishable has been destroyed; no such terrible destruction and destitution ever before experienced in the history of this section. Springfield, 5th, rain-fall for past five days measured 9.96 inches, heaviest ever known; rivers converted into raging torrents and small streams into large rivers; very serious washouts on railroads, travel generally suspended. Warsaw, 22d, 35.000 acres of land submerged by the breaks in the Warsaw and Indian Grove levées; the damage to railroads, live stock and farming property make this flood the most disastrous that has ever occurred in this section; 29th, the damage to property along the Mississippi between Keokuk and Louisiana, Mo., is estimated at $2,930,000; several days will elapse before business can be resumed at the river towns. Carlinville, 14th, hay and corn rotting in the fields; hundreds of acres under water; all streams overflowed; most disastrous flood for years. Galena, 21st, one of the principal thoroughfares of the city under water from one end to the other; City Hall and Market House, Custom House and Post Office surrounded; all railroad tracks under water and travel generally suspended. Rockport, 22d, although situated four miles from the Mississippi, a serious flood is imminent; people fleeing to places of safety; roads leading outward from the bottoms crowded with teams hurrying away with goods; hundreds of animals driven away from the flooded region. Moline, 12th, work suspended in mills; 27th, corn fields in vicinity all under water and crop will prove a total loss. Rock Island, 14th, many cellars and streets flooded in upper part of town; 17th, lower part of town flooded; families moving to escape danger; 21st, the entire lower portion of the town flooded. *Iowa:* Burlington, 24th, river reached the high-water mark of 1880; width said to be seven miles; hay stacked along the low-lands on the Illinois side is a total loss. 27th, river seven inches above the flood-tide of 1880. 31st, river continued to rise. Davenport, 12th, water so high at mouth of Rock river that nearly the whole of "Big Island" was submerged; corn fields in vicinity flooded and operations suspended in mills; trains stopped on C. M. and St. P. R. R. on account of high water; much debris, fences and remains of wood yards passing. 15th, river continued to rise; all trains for Rock Island stopped; men are kept watching and strengthening the dyke which threatens to give way. 19th, river rose two inches; street car tracks in some localities under water. 20th, river continued to rise; all of the wood side-walks afloat; streets impassable. 21st, river rising; the Davenport division of the C. M. and St. P. R. R. Co. moved their engines out of the round-house and stored them in the round-house of the C. R. I. and P. R. R. Co., for safety from damage by flood; water stopped the Holly engine at the water works. 22d, river reached the sidewalk on First avenue, and stretched from there to Iowa street in an unbroken waste of water; cars on the Peoria and Rock Island R. R. stood out 200 feet in the river, all tracks submerged, cellars,

warehouses, basements and stores badly flooded, causing great loss; work in all industrial establishments has been suspended. 23d, river rising; first floors of all buildings from Iowa to Rock Island streets flooded. 24th, river rising slowly. 27th, river stationary; the steamer "Jennie Gilchrist," after passing through the draw of the Government bridge, was swung around by the fierce current and thrown violently against the latter causing a total wreck. 28th, river commenced falling slowly. Dubuque, 8th, work suspended in mills on account of high water; flats overflowed; island covered; cellars filled; over 200 men thrown out of employment. 10th, river two miles wide; thirty houses on flats submerged to second stories; a number of families living on the low lands of East Dubuque, were compelled to abandon their homes; mills and factories compelled to suspend operations. 11th, river rising slowly. 21st, river 21 feet above low water mark, and but 18 inches below the highest water ever known; railroad tracks and warehouses flooded; reports from interior of State show that in over one-fourth of northern Iowa the hay crop is entirely ruined; entire farms for scores of miles completely under water; the flax crop is ruined. Keokuk, 2d, considerable damage to the K. and St. L. R. R., seven miles below station; river rising rapidly. 4th, bridges carried away on the K. and St. L. R. R. 9th, river rising slowly. 13th, river reached danger-line this morning; railroad tracks under water. 14th, several mills and factories suspended business. 17th, river still rising rapidly; Des Moines river very high, breaking the Egyptian levee near Buena Vista. 29th, low lands for miles entirely under water; canal closed and steamers pass over the rapids; from the large bridge to Hamilton one unbroken sheet of water covered with debris of every nature; water within 15 inches of the high water mark of 1851. Clayton, 11th, river rose over 6 inches in past 24 hours; largest rise ever experienced for this season of the year; considerable loss to property. Guttenburg, 30th, no farm work can be done on account of wet weather; during a period of 30 years the river at this point has not been as high at this season of the year, and never during that time has the damage to the corn crop been so great; large quantities of hay have been floated off by the high water. Muscatine, 28th, river reached its highest point (17 ft., 8 in. above low-water mark) it being the highest ever known, and one-half inch higher than the June rise of 1880. Clinton, 26th, river rose 19 ft. 10 in., which was only 11 in. below extreme high water mark; highest water ever known at this season of the year. *Kansas:* Yates Centre, 5th, Cedar Creek rose 8 ft., the largest rise for a number of years; 9th, rose 3 ft. in 20 minutes; 17th, rose 9 ft. in a few hours; stock, corn and fences were swept away. Month remarkable for unusually heavy and frequent rains, it being the wettest October for many years. *Minnesota:* New Ulm, 14th, river overflowed and rising rapidly. Sleepy Eye, 14th, all streams flooded; much damage in surrounding country. Le Sueur, 14th, considerable loss of hay along the bottoms; earth filled with water, rendering almost impossible to travel any distance, even on horseback. St. Peter, 14th, river rising rapidly; corn fields under water; loss of hay serious. Fairbault, 14th, Straight river overflowed, carrying away dams and bridges. Shakopee, 14th, all railroad travel suspended; great quantities of hay washed away; river still rising. Kasota, 7th, river overflowed and the surrounding country flooded; many farm houses rendered uninhabitable by the water which surrounds them. Mankato, 7th, Minnesota river overflowed for miles, great damage to hay and buildings. St. Paul, 5th, some of the low lands on both sides of the river near the town partially flooded; large quantities of cord-wood have been carried away. 6th, river rising slowly, causing much alarm to the residents of West St. Paul. 7th, river rising. *Missouri:* Hannibal, 28th, the break in the Sny Levee 300 yards north of the Hannibal bridge has a width of 200 feet; everything carried away by the rushing torrent; all reclaimed land back of Lewes under water; considerable loss of stock by drowning; aggregate loss from overflow about $500,000. Alexandria, 26th, river one foot above the flood mark of last spring and within 2 feet and four inches of the great rise of 1851; city almost entirely inundated; people living in the upper stories of their dwellings or leaving the city in skiffs. Clarksville, 21st, river seven inches above the high water mark of last spring; all people living in the bottoms have been driven from their homes; great suffering from loss of property and the necessaries of life. The following general summary of damage sustained by the country along the central portion of the Mississippi river although, perhaps, not more than approximating the truth will be found of interest: Warsaw Drainage district, $600,000; Indian Grave district, $750,000; Sny Island district, $1,000,000; Quincy Bay and City, $3,000; Alexandria and vicinity, $250,000; Keokuk and St. Louis R. R., $100,000; other railroads, $60,000; open lands north of Sny Levee, $150,000; total, $2,913,000. *New Mexico:* Las Vegas, 6th, great damage on the Atchinson, Topeka and Santa Fe R. R.; all traffic south of this point suspended; in the Rio Grande and Gallister valleys numerous heavy washouts, and in many places road-bed covered with great heaps of sand. *New York:* Buffalo, 2d, one of the heaviest rain-falls that ever occurred in this vicinity; sewers broken, streets badly washed and many buildings flooded. *North Carolina:* Highlands, 27th to 30th, rain-fall 8.57 inches, accompanied by the severest freshet experienced for many years. *Texas:* Grierson Springs, owing to the heavy rains of the latter part of month, the canyon in which the station is situated was flooded for several days, and buildings were in danger of being swept away. Brackettville, 1st, streets flooded; one man was drowned, and many persons narrowly escaped similar fate. Reliable estimates of damage done are as follows: to stores and

private dwellings in Brackettville, $7,000; damage sustained by ranchmen in surrounding country, $16,000; two men alone lost 2,326 head of sheep; damage to grading on Mexican Pacific Railroad in Kinney county, $50,000; total, $73,000. In the Pinto and Los Mares rivers water rose from 3 to 5 feet, doing an immense amount of damage. *Wisconsin:* Stillwater, 4th, river 13 feet and 9 inches above low-water mark; mills shut down; bridges and dams carried away. Warsaw, 4th, most remarkable flood on record; highest water ever known; 8,000,000 feet of logs swept away; roads badly washed, and bridges and lumber-piles carried away; total loss in Marathon county alone, over $150,000. Stevens Point, 14th, Black river rose 8 feet in past twenty-four hours; surrounding country flooded; heavy floods reported along Wisconsin river. Galesville, 12th, highest water for many years; all hay along the streams ruined. 14th, roads impassable and all kinds of business seriously embarrassed. Eau Claire, 12th, Chippewa river 7½ feet above low water mark. 13th, river 14 feet above low water mark and rising at the rate of 2½ inches per hour; Eau Claire river highest ever known; several buildings undermined and washed out in the river; 40,000,000 feet of logs carried out. Oskosh, 7th, exceedingly heavy rains; serious washouts on the Chicago and Northwestern R. R., and on the Milwaukee, Lake Shore and Northwestern R. R.; communication generally suspended; country round about badly flooded. Merrill, 4th, river higher than ever known before; all mills shut down; several railroad bridges carried away. Prairie du Chien, 11th, river rising rapidly; all travel suspended on the C. M. and St. Paul R. R., and five miles of track washed out. Waupaca, 14th, vast amount of damage by heavy rains; potatoes lying in the ground by the thousands of bushels, it being too wet to remove them; corn still unhusked and clover seed too wet to thresh. Fon du Lac, 15th, streets impassable and cellars and basements flooded; heavy losses in the country. 18th, roads again flooded; in places, stacks of unthreshed grain rotting. Horicon, 15th, thousands of acres overflowed and many highway bridges swept away. Packwaukee, 15th, all bridges between this point and Portage washed away. Fox Lake, 14th, potato crop rotting in the mud, cut hay rotting and floating away; unthreshed grain spoiling and corn sprouting in the fields; impossible to drive over fields, owing to the very soft condition of the soil. Chippewa Falls, 13th, river highest for many years, bridges on all the small streams carried away; roads impassable, trains delayed and all kinds of work at a stand-still. Edson, 14th, entire town flooded, loss of property will reach into the thousands. Milwaukee, 18th, dam in Milwaukee river swept away. La Crosse, 2d, the recent heavy rains have caused the tributaries to the Mississippi in this vicinity to rise to such an extent as to cause alarm. The Black river valley flooded and a great deal of property destroyed; bridges, dams, etc., have been swept away and much timber lost; farms inundated on both sides of the Mississippi and Black rivers. 13th, Mississippi river stationary at 12 feet one inch above low water mark; Black river highest ever known for the season; Wisconsin river experienced the heaviest rise ever known for this season of the year and serious damage was caused. 16th, much damage done to stacked wheat and hay; corn in great quantities was floated away and large fields of potatoes in some places entirely under water.

Drought.—Connecticut: New London, 29th, ground parched as if a forest fire had swept over it; streams that have never been known to fail are now reduced to a mere rivulet or dried up altogether; no rain has fallen for many weeks; farmers suffering great distress through the drying up of wells and cisterns. Southington, up to the 30th, drought continued with unabated severity; although rain fell on 13 days the quantities were so small as to be scarcely noticeable; a natural pond in the vicinity has remained dry for more than four weeks, a condition which has not occurred before within the past 20 years. *Maryland:* Fallston, 30th, springs and wells very low; farmers driving stock long distances for water, and in some localities are hauling water for domestic purposes; pasturage very poor. Sandy Springs, very dry until 24th; wheat crop seriously injured. *New Jersey:* Patterson, 22d, most serious drought ever experienced; no water has passed over Passaic Falls for the past two months, and for a longer period the mills on the race have been but in partial operation; this is the fourth month of the continued drought; during the months of July, August, September and October, the total rainfall was only 7.83 inches, a deficiency of 8.28, or more than 100 per cent. when compared with the average for those months for the past half century. Since 1830, only one year (1854) has a smaller rain record for those months, than the present year. There is no record of the Passaic river being as low as during the prevalence of this drought. Moorestown, the abundant rains of the 30th and 31st, close a period of the most terrible drought experienced during the past 18 years. *Pennsylvania:* Dyberry, drought continued unabated until last of month. Chambersburg, 28th, dry weather still continues. Milton, 29th, drought still severe; many wells exhausted, some of which were never known to have failed before. Wellsboro, 30th, wells, springs and streams still very low. *Tennessee:* Ashwood, 30th, the protracted drought of summer continued until the middle of the month. *New York:* Jefferson Co., 15th, drought still unabated at Woodville; people hauling water for drinking and culinary purposes. *Rhode Island:* Providence, 15th, the severe drought of the past two months continues unabated; mill streams are so low that only steam power can be used; many reservoirs are exhausted.

Water Spouts.—Off the coast of Cheboygan Co., Mich., and near Mackinac straits, a large and well defined water spout was observed on the 1st by passengers on the steamer *Flora*; the phe-

nomenon lasted 30 minutes. Barnegat, N. J., 18th, 4 miles below station, moving southeastward across the bay.

High Tides.—Indianola, 1st, 8th; Norfolk, 5th; New London, 26th; New Haven, 29th.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left-hand side of chart No. III. Owing to the breakage of instrument, observations at Charleston, S. C., wanting from the 1st to 7th.

ATMOSPHERIC ELECTRICITY.

Thunder Storms.—In the various districts they were reported as follows: New England, 3d, 17th, 18th; Middle Atlantic states, 1st, 17th, 18th, 30th, 31st; South Atlantic states, 17th, 18th, 19th, 30th, 31st; East Gulf states, 1st, 16th, 18th, 19th, 23d, 29th, 30th; West Gulf states, 4th, 11th, 15th, 17th, 23d, 26th, 27th, 29th; Rio Grande valley, 22d, 23d, 26th; Ohio valley and Tennessee, 2d, 3d, 4th, 8th, 9th, 13th, 15th to 19th, 28th to 30th; Lower Lake region, 2d, 8th, 15th, 17th, 27th; Upper Lake region, 1st, 6th to 8th, 12th, 14th, 15th, 17th, 28th, 29th; extreme Northwest, 10th, 11th; Upper Mississippi valley, 3d, 4th, 7th, 8th, 11th, 13th to 16th, 19th, 21st, 27th, 28th; Missouri valley, 1st to 4th, 8th to 18th, 21st to 23d, 27th to 30th; Northern Slope, 10th, 16th; Middle Slope, 8th, 11th, 12th, 14th to 16th, 21st, 22d, 26th, 27th; Southern Slope, 3d, 12th, 13th, 16th to 18th, 22d, 26th; Southern Plateau, 3d to 8th, 12th to 15th, 18th, 21st, 23d, 24th; Middle Plateau, 10th, 25th; Northern Plateau, 6th.

Auroras.—The most general display was that of the night of the 16th and 17th, which was observed from Sydney, N. S., westward to Ft. Sisseton, Dak., and as far south as Freehold, N. J., 17 intervening stations reporting. The display was not a very remarkable one, many of the features usually observed being absent. The display of the 18th was exclusively observed in the Lake region being reported by the following stations: Marquette, 18th, from 10.10 to 11.15 p. m.; Mission House, Wis., 18th, from 9 to 11 p. m., faintly illumined arch, with dark cloud underneath; Alpena, Mich., 18th, 9.10 p. m., diffuse light without streamers; Toronto, 18th. Other displays were reported as follows: Charlottetown, P. E. I., 20th, 21st, 27th. Fredericton, N. B., 7th, 19th, 27th. Dexter, Mé., 19th, faint. Mt. Washington, 19th, from 11.22 p. m., to early morning of 20th, faint light. Burlington, Vt., 19th, from 11 to 11.45 p. m., faint; 20th, 11 to 11.30 p. m., faint; 26th, 11 to 11.40 p. m., faint; 27th, 11 to 11.45 p. m. A noteworthy feature of the display of the 27th was its nearness to the horizon; the dark segment was about 2° above the horizon; dancers and streamers were observed, the latter shooting up to a height of 25°; the general color was a faint yellowish light, but that of the dancers was a pale green. Woodstock, Vt., 19th. South Lee, Mass., 29th, p. m. Eastport, Me., 27th, 10 p. m. to midnight; extended from NW. to NE. and to an altitude of 15°; at 11 p. m. numerous beams appeared, all radiating from the same magnetic point, resembling rays of light from the sun, such as are sometimes seen after sunset; their color was a bright yellow. Newport, R. I., 3d, 7 to 9 p. m. Toronto, 20th, 26th. Alpena, 20th, 8.40 p. m, faint yellow light, with an occasional streamer; ended at 1 a. m. of 21st. Marquette, 20th, 9,50 p. m.; very brilliant at 10.40 p. m., when beams began to shoot up to a height of 30°; the entire northern heavens was illuminated; disappeared at 11.40 p. m. Escanaba, 8th, 9.15 to 9.35 p. m., a few streamers pointing toward zenith; 20th, 10.05 to 11.30 p. m., consisting of beams of pale yellow, having a wavy motion from E. to W. Ft. Snelling, Minn., 31st, 5 a. m. St. Vincent, Minn., 19th, 9 p. m., low down in the north; was bright, sending up many streamers until midnight; 20th, from 8 to 10 p. m., consisting of an arch of about 15° in height, with dark segment; a few streamers and folds; 27th, from 8 to 10 p. m., about 20° in height; was partially obscured. Riley, Ill., 21st, a mere northern twilight; altitude about 12°. Keokuk, 12th, aurora probable; clouds unusually bright in the northern sky from an altitude of 8° to zenith; earth currents interrupted telegraphic communication. New Corydon, Ind., 19th, 2 a. m., strong auroral light; 22d, 2 a. m., strong auroral light.

Atmospheric Electricity Interfering with Telegraphic Communication.—Silver City, N. M., 3d; Stockton, Tex., 12th, 16th, 17th.

Zodiacal Light.—Monticello, Ia., 25th; Des Moines, Ia., 4th; Cambridge, Mass., suspected, 11th, 14th, 26th; Nashville, Tenn., 1st, 2nd, 3rd. New Corydon, Ind., 20th to 23d, 25th to 27th.

OPTICAL PHENOMENA.

Lunar halos have been observed in the various districts on the following dates: New England, 3d, 5th, 6th, 7th, 28th, 30th, 31st; Middle Atlantic states, 2d, 3d, 6th, 7th, 9th, 12th, 28th; South South Atlantic states, 2d, 6th, 7th, 9th, 29th, 30th; East Gulf states, 2d, 7th, 8th; West Gulf states, 2d, 3d, 4th, 10th, 28th to 31st; Rio Grande valley, 3d, 5th, 6th, 27th; Ohio valley and Tennessee, 2d, 3d, 7th, 8th, 9th, 11th, 17th, 22d, 27th, 29th, 30th; Lower Lake region, 6th, 7th, 11th, 12th, 28th, 30th, 31st; Upper Lake region, 5th to 11th, 30th, 31st; extreme Northwest, 2d, 9th; Upper Mississippi valley, 2d, 3d, 6th, 8th, 9th, 29th to 31st; Missouri valley, 2d, 3d, 4th, 6th, 12th, 29th, 31st; Northern Slope, 6th, 15th, 28th, 30th; Middle Slope, 1st, 6th, 8th; Southern Plateau, 2d, 27th to 30th; Middle Plateau, 6th, 28th; Northern Plateau, 7th, 8th, 31st; North Pacific region, 14th; Middle Pacific region, 11th, 18th, 28th; South Pacific region, 2d.

Solar halos have been observed in the various districts on the following dates: New England, 2d, 9th, 12th, 19th, 20th, 22d, 23d, 28th, 30th; Middle Atlantic states, 14th, 15th, 16th, 19th, 28th; South Atlantic states, 8th, 23d, 27th; East Gulf states, 1st, 21st, 30th; West Gulf states, 21st, 29th; Ohio valley and Tennessee, 6th, 7th, 11th, 17th, 19th, 21st to 23d, 27th to 29th; Lower Lake region, 6th, 11th, 17th, 19th, 23d, 27th, 28th, 30th, 31st; Upper Lake region, 11th, 27th; extreme Northwest, 1st; Upper Mississippi valley, 1st, 5th, 7th, 11th, 20th, 21st; Missouri valley, 26th; Middle Slope, 6th, 18th, 26th, 30th; Northern Plateau, 8th, 14th, 26th, 27th; Southern Plateau, 25th; Middle Pacific coast region, 11th, 17th, 30th.

Mirage.—Indianola, 19th, 20th; New Haven, 28th, 7 a. m.

MISCELLANEOUS PHENOMENA.

Earthquakes.—In the mining district of Taversal, Nottinghamshire, England, August, 1881, violent shock in one of the pits of the Stanton Iron Works Co., having a depth of 1290 feet. The miners were so alarmed at the accompanying noise that they rushed to the mouth of the pit, thinking that an explosion had occurred. In Pear Tree Inn, Fackley, bricks were removed from the chimney; the same thing occurred in a house at Taversal. At the latter village, the station master, while sitting in his house was thrown from his chair by the shock and a quantity of plastering was detatched from the ceiling. There was no explosion in the mines or the occurrence of other ordinary circumstances to account for the phenomenon, but the cause as supposed was clearly indicated by the upheaval of the floor o one of the pits, showing that the seat of the disturbance was below the workings of the mine. This observation would appear to refute the general impression that earthquake shocks are seldom if ever felt at any great depth beneath the surface, as in deep mines. Hawaiian Islands, September 13th, 1881, island of Maui visited by very violent shocks. Constantinople, September, 1881, heavy shocks at Gallipoli and Adrianople during latter part of month. Chaugeri, Province of Anatolia, Turkey, September 30th, 1881, heavy shock, 11 persons killed; the grand mosque and many dwellings greatly damaged. The following observations were made on the Island of Ukamok, Alaska Territory, (55°, 48′ N., 155°, 34′ W.,) by Mr. Alexander Newlander, who resided there during the year ending June 30th, 1881: "September 28th, 1880, 6 p. m., three very heavy and successive shocks, direction of first shock N. to S., the remaining two from W. to E.; 9 p. m., severe shock from W. to E. 29th, 3 a. m., very heavy shock from W. to E; 1 p. m., extremely heavy shock from W. to E. From the commencement of this phenomenon, September 28th, 1880, until its subsidence October 16th, 1880, there was an uninterrupted trembling motion of the earth interspersed with heavy subterranean rumbling sounds. During a short trip over a portion of the Island on September 29th, deep fissures with a width of from 15 to 20 inches were were found to be very numerous. The residence of Mr. Newlander, one story high and substantially built of logs, was situated about 500 yards from shore, on rising ground and about 20 feet above sea-level. During the heavy shocks shelves were wrenched from the walls, a brick stove upset, the flooring twisted out of shape and heavy beef and flour barrels (full) were pitched from one side of the room to the other. Outside of the building no one was able to stand on their feet owing to a violent, jerky and rotary motion of the earth, which continued for at least 20 minutes. The action upon bodies of water is given as follows: Several times at low water the sea rose in a body, travelling inshore about 60 yards when it would subside, immediately followed by a succession of similar waves. The water in the creeks overflowed their banks to the eastward as indicated by the condition of the ground on that side which was dotted by numerous small pools of water, some of which were fully 40 yards distant from the east bank. On the south side of the Island a small shallow creek, across which one could have easily stepped previous to the earthquake, was now widened about six feet; the fresh water was changed to salt water, and the depth so increased, that the bottom was not discernable. After the shocks, heavy breakers were observed on the southwest shore of the Island, where, for the past four years, no such phenomenon has been observed. On the west side of the Island, the tide does not rise as high as before the shocks. The wind during the shocks was invaribly from the WNW., and whenever it changed to easterly no shocks were experienced, and the trembling of the earth would diminish considerably." Nickerie, Dutch Guiana, June 20th, 1881, 11 a. m., two successive shocks, one immediately following the other, and each lasting about ten seconds; the second was slightly longer in duration and stronger than the first. The shocks were preceded, accompained and followed by a dull, rumbling noise, resembling that of distant carriage wheels. The sensations to a person seated in a chair were as if some one was shaking the floor on which the chair stood, by a rapid to and-fro movement of the arms. A peculiar feeling of nausea was experienced for about a minute after the shocks. The air was very warm and oppressive, and the barometer stood at 30.21, the thermometer at 86°; sea very calm; slight breeze from the east. Bristol, N. H., October 6th, 1881, heavy shock l ttle after midnigat, direction west to east; noise like the rumbling of a heavy train of cars; buildings jarred preceptibly. Kamouraska, Province of Quebec, 5th, severe shock. Concord, N. H., 6th, heavy shock about midnight; at Tilton it jarred houses and rattled dishes. Ashland, N. H., 6th, slight shock about midnight, lasting a few seconds. Virginia City, Nev., 21st, 7 p. m., two shocks, quite heavy, each lasting about two seconds; direction southwest

to northeast. Campo, Cal., 2nd, 9 a. m., sharp shock, preceded and accompanied by a heavy rumbling sound and tremulous vibration, which rapidly increased in severity, shaking buildings and causing crockery to rattle; motion was from SE. to NW.; duration 8 to 10 seconds. Carson City, Nev., 21st, 6.41, p. m., two slight shocks; motion from S. to N.

Meteors.—Campo, Cal., 30th, 7 p. m., brilliant. Boise City, Idaho, 4th. Pioche, Nev., 13th, 29th. Florence, Ariz., 12th. Little Rock, 21st, very brilliant, moving from W. to S., trail very broad and resembling that of a rocket, flight lasted about 8 seconds. Mobile, 18th, 2.20 a. m., appeared in the east about 65° above the horizon, and moved rapidly in a northwesterly direction toward the earth; when about 10° above the horizon it burst with a loud report, throwing off a shower of brilliant fragments, each of which left behind it a bright trail; the entire western sky was illumined by the explosion, which left a cloud that remained visible nearly ten minutes. Pensacola, Fla., 17th, 18th. Southington, Conn., 22d. Morrison, Ill., 18th. Charleston, Ill., 26th. New Corydon, Ind., 7th, 8th, 21st, 22d. Vevay, Ind., visible nearly every night; brilliant on 26th. Monticello, Ia., 18th. Woodstock, Md., 15th, 16th, 21st. New Bedford, Mass., 17th, 1 a. m. Thornville, Mich., 26th. Fayette, Miss., 13th to 15th, 17th, 25th, 30th. Oregon, Mo., 19th, 24th, 25th. Atco, N. J., 26th, 27th. Freehold, N. J., 11th, 18th, 20th. Moorestown, N. J., 22nd. Ithaca, N. Y., 16th. Elsworth, N. C., 10th. Westerville, Ohio, 10th. Stateburg, S. C., 9th, 16th, 21st, 27th. Wytheville, Va., 10th. Mr. William J. Fisher at St. Paul, Kodiak Island, reports, December 30th, 1880, 8.30 p. m., "observed very large meteor, at least 7 feet in length and in circumference about the size of an ordinary barrel. Direction of path, ESE. to WSW.; in shape, conical, the pointed end smooth, while the blunt end (which was in front) had a jagged and corrugated appearance. It emitted a very intense light yellowish color, mingled along the jagged end with a bluish tinge; innumerable bright sparks were thrown off during its flight. The velocity with which it travelled seemed to be about equal to the speed attained by a shell fired from a heavy gun at long range, and the accompanying noise was almost identical with that made by the shell during its flight. The meteor descended into the water near Bliski Island, about 50 yards from shore; when it struck a large volume of water was thrown upon the neighboring land." Winona, Minn. 6th, 8 p. m., very brilliant; exploded like a rocket in a shower of vivid colors and rapidly disappeared.

Annual Fog Wave of 1881, at New Westminster, B. C., concerning which the following remarks are of interest: Exceedingly heavy rains prevailed from the 16th to the 20th of October, clearing away all the snow of the past winter, except small quantities in the crevices of the mountains. Calm weather now set in, and local fogs began to form along the river, as usual at this time of the year. These fogs lifted each day before 12 m., disclosing a cloudless sky, until the 23d, when the fog remained all day, not lifting before 9 p. m. On the morning of the 24th the fog was very thick along the river, but cleared at noon, with cloudless sky and SSW. wind. On the 25th the fog did not lift until noon, when a little cirro-cumulus, in streaks, could be seen stretching from east to west, with a slight movement from the east. Quite warm at 1 a. m.; temperature, 52°. At 2 p. m. a heavy bank of clouds rose up in the south, with a band of cirrus on its upper edge; barometer falling rapidly. This bank gradually ascended, and at 3.45 p. m. obscured the sun; it now rolled rapidly inland, causing the thermometer to fall some 8° almost instantly, and throwing out an advanced guard of the main body of the fog, distant about one mile to the west. Following this condition, the fog gradually thickened, and at 5 p. m. the barometer read 29.708, falling; temperature, 43°, wind, SSW. The following observations were taken during the 25th: 9 a. m., 29.799, 37°, NE; 3 p. m., 29.748, 47°, SW.; 3.45 p. m., 29.728, 45°, SSW.; 4.10 p. m., 29.718, 44°, SSW.; 5 p. m., 29.70⅛, 43°, SSW.; 9 p. m., 29.683, 42°, calm.

Migration of Birds.—Geese flying south: Cheyenne, Wyo., 8th; Deadwood, Dak., 12th; North Platte, Neb., 9th; Ft. Supply, Ind. T., 12th, 13th, in large numbers; Grierson Springs, Tex., 11th, 18th; Stockton, Tex., 1st, 11th, 18th; Coleman, Tex., 12th; Huron, Dak., 4th, 7th, 8th, 20th; Yankton, 8th, 12th, 30th; St. Louis, 16th; Davenport, 15th, 16th, 17th, 30th; Springfield, Ill., 14th; Cairo, 5th, 6th, 23rd, 26th, 27th; St. Paul, 14th; Little Rock, 5th, 24th; Ft. Gibson, 5th, 13th; Indianola, 14th; Milwaukee, 26th; Morgantown, 14th, 18th; Augusta, Ga., 20th; Macon, N. C., 16th; Riley, Ill., 9th; Peoria, Ill., 15th; Ft. Wayne, Ind., 16th; Independence, Kan., 9th; Monticello, Iowa, 12th, 13th; Fall River, Mass., 11th; Northport, Mich., 3rd, 4th; Oregon, Mo., 3rd, 13th; Clear Creek, Neb., 8th, 12th, 30th; Franklin, Pa., 2nd; West Chester, Pa., 7th, 8th; Ashwood, Tenn., 5th; Johnsontown, Va., 14th; Embarras, Wis., 4th, 10th; Clay Centre, Kan., in unusually large numbers. Wood's Holl, Mass., flying *west*, 12th. *Ducks flying south:* Stockton, Tex., 11th, 18th; Grierson Springs, Tex., 18th; St. Paul, 25th, 30th; Little Rock, 5th, 24th; Ft. Gibson, 5th, 13th; Indianola, 14th; Augusta, Ga., 2nd, 4th; Macon, N. C., 16th; Swanwick, Ill., 14th; Northport, Mich., 3rd, 4th; Clear Creek, Neb., 6th, 19th, 24th. *Pigeons flying south:* Little Rock, 5th, 24th; Ft. Gibson, 10th.

Insects.—Cotton Worm:—Franklin, Ark., 30th, many fields of cotton entirely stripped of leaves; cotton crop damaged about 70 per cent. Ashwood, Tenn., 15th, appeared in myriads and in a few days devoured all the leaves; after destroying the cotton, the worms attacked the wheat crop, doing a vast amount of damage; one farmer lost 100 acres, every blade being eaten to the ground. Clarksville, Tex., 20th, after the rains of the first part of month, the cotton worm

inflicted great damage upon cotton, wheat and grass. *Hessian Fly.*—Ruggles, Ohio, 30th, early wheat severely injured.

Prairie and Forest Fires.—Ft. Stevenson, Dak., 3d, 10th; Salt Lake City, 7th, in mountains; North Platte, Neb., 1st; Ft. Keogh, Mont., 10th; Ft. Buford, Dak., 10th; Moorehead, Minn., 18th to 20th, 22d, 26th; St. Vincent, Minn., 23d; Ft. Stevenson, Dak., 30th; Huron, Dak., 1st, 9th to 11th, 16th, 17th, 19th, 20th, 24th, 27th, 30th, 31st; Yankton, Dak., 18th to 20th, 24th to 26th, 31st; Mason, Tex., 17th.

Polar Bands.—Prescott, Ariz., 3d, 30th; New Corydon, Ind., 6th, 7th, 19th, 20th, 27th; Gardiner, Me., 1st; Fayette, Miss., 25th; Clear Creek, Neb., 21st; Wytheville, Va., 8th, 22d, 27th, 28th.

Sand Storms.—Umatilla, Or., 3d; Camp Thomas, Ariz., 20th, 23d, 29th.

Sunsets.—The characteristics of the sky at sunset, as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from 175 stations show 5,387 observations to have been made, of which 32 were reported doubtful; of the remainder, 5,355, or 86.2 per cent., were followed by the expected weather.

Sun Spots.—The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass:

DATE— October, 1881.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		REMARKS.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots	
1, 9 a. m	0	0	0	0	0	0	5	9	
3, 4 p. m	2	25†	1	2	0	0	6	35†	Many of the spots small.
4, 9 a. m	0	0	1	5	0	0	5	30†	Many of the spots small.
5, 2 p. m	0	0	1	3	0	0	4	27†	
6, 10 a. m	0	5	0	0	0	5	4	25†	
7, 4 p. m	0	0	0	0	0	0	3	2 7	
8, 3 p. m	0	0	0	0	0	0	3	20†	
10, 1 p. m	1	3	0	3	1	3	4	20†	
11, 1 p. m	0	0	1	2	0	0	3	18	
14, 10 a. m	1	3	0	0	1	3	4	15	
16, 1 p. m	2	5	1	3	2	5	4	12	
18, 1 p. m	1	3	1	2	1	2	4	15	Spots probably disappeared by solar rotation.
20, 1 p. m	0	10†	0	0	0	0	4	25†	Many of the spots small.
21, 10 a. m	1	20	0	0	1	2	5	45†	Many of the spots small.
3 p. m	0	0	0	0	0	0	5	45†	
25, 2 p. m	0	0	.....	.....	0	0	4	30†	
27, 11 a. m	1	3	1	15†	1	3	4	18†	

†Approximated. Faculæ were seen at the time of every observation.

Mr. H. D. Gowey, at North Lewisburg, Ohio, reports: Sun spots were observed on every clear day during the month. They were largest and most numerous on the 9th and 21st and least at the close of the month. Mr. David Trowbridge at Waterburg, N. Y., reports as follows: 1st, 4 groups, 5 spots; the new group mentioned Sept. 30th has gone out; 1 new group, 2 spots, has appeared by rotation, and a new one has arisen in the east; faculæ. 3d, 5 groups, 9 spots, one group has disappeared by rotation; 3 groups, spots faint, have arisen since the 1st. 4th, 3 groups, 4 spots, 2 groups have gone out. 5th, 4 groups, 6 spots, one new group just appearing by rotation. 6th, 4 groups, same as 5th, 5 spots. 8th, 3 groups, 6 spots, one group has disappeared by rotation, one gone out and one arisen. 9th, 3 groups, same as 8th, ten spots. 11th, 3 groups, 5 spots, one group has disappeared and one appeared by rotation. 14th, 4 groups, 4 spots, a new group has appeared by rotation, faculæ in the east. 16th, 4 groups, 6 spots, 2 new groups have appeared by rotation and 2 gone out since the 14th. 20th, 3 groups, 10 spots, several larger. 21st, 3 groups, same as 20th, 7 spots. 22d, 4 groups, 9 spots, one group appears to have broken into two. 23d, 4 groups, same as 22d, 7 spots, cloudiness interfering with observation. 26th, 3 groups, 3 spots; they appear to be the same as some observed on the 23d. 27th, 5 groups, 6 spots one group appeared by rotation and one has arisen; faculæ in the east and west. 30th, no spots observed, atmosphere somewhat hazy.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.

A. B. Dyer

Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

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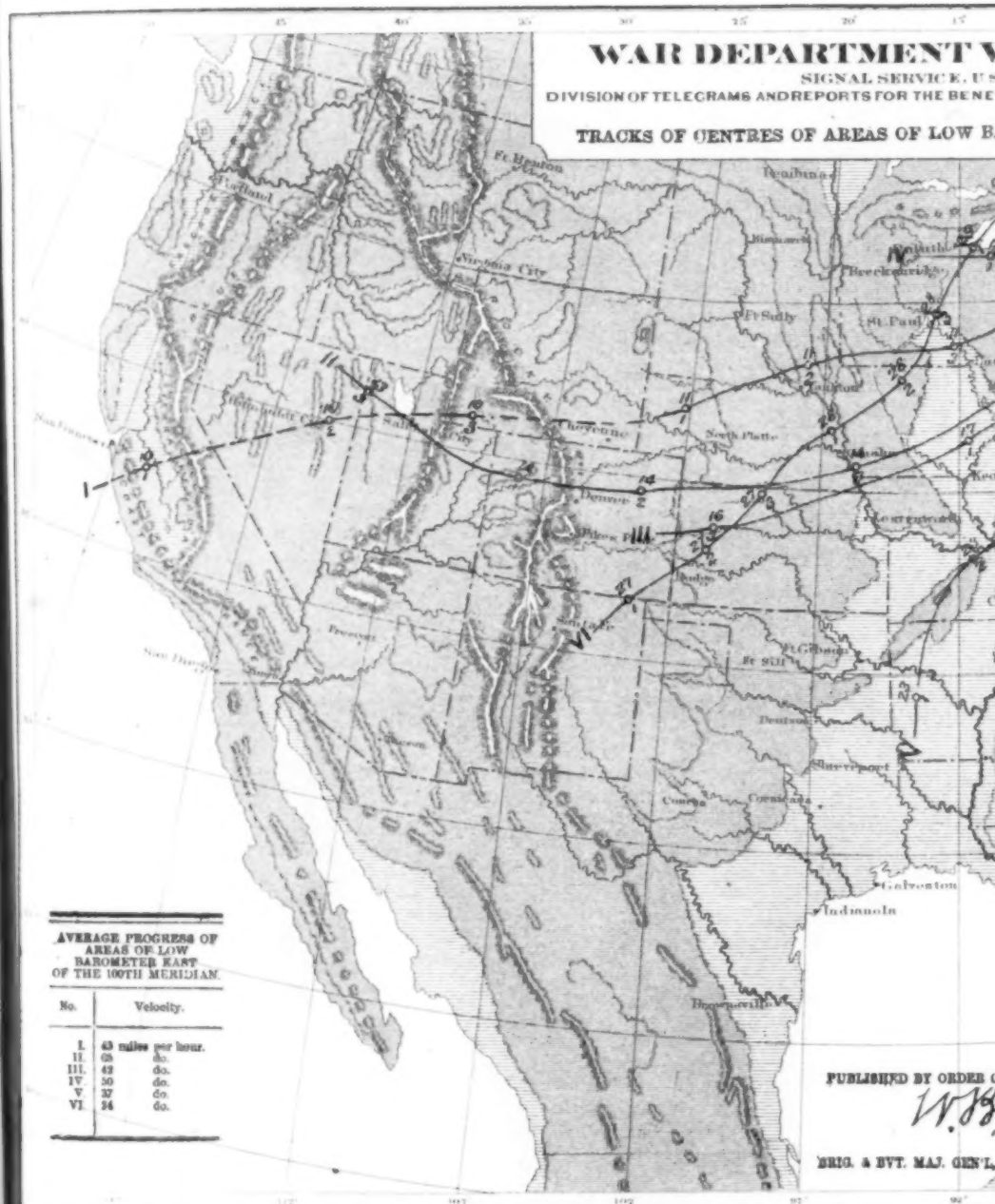
WAR DEPARTMENT W

SIGNAL SERVICE, U.S.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENE

TRACKS OF CENTRES OF AREAS OF LOW B



AVERAGE PROGRESS OF AREAS OF LOW BAROMETER EAST OF THE 100TH MERIDIAN.

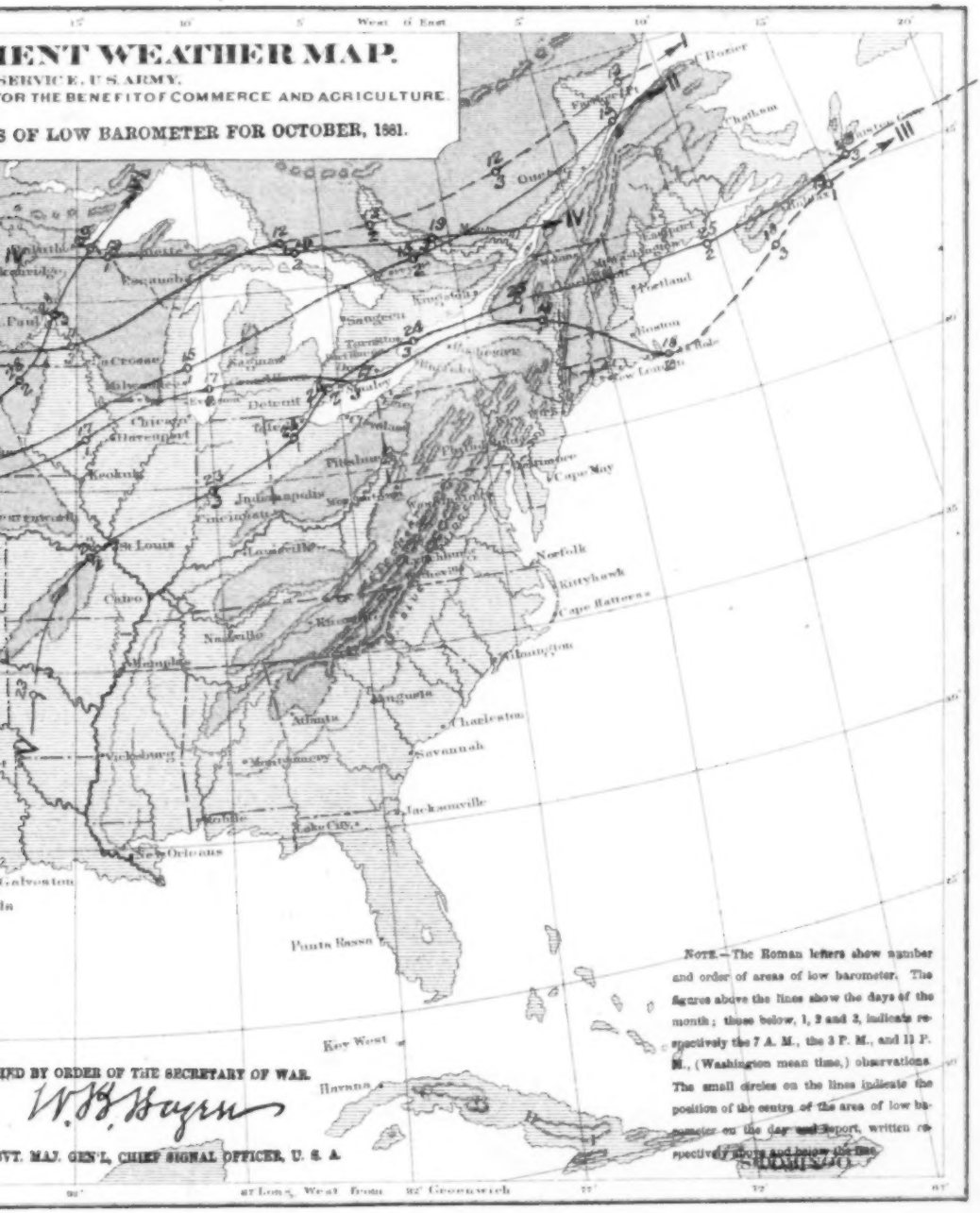
No.	Velocity.
I.	43 miles per hour.
II.	68 do.
III.	42 do.
IV.	30 do.
V.	37 do.
VI.	34 do.

PUBLISHED BY ORDER O

W. B

BRIG. & BVT. MAJ. GEN'L

No. I.


HENT WEATHER MAP.
SERVICE, U S ARMY.
FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.
S OF LOW BAROMETER FOR OCTOBER, 1881.
Portland
Boston
Cape May
Norfolk
Kittyhawk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Key West
Havana
Punta Rassa
Galveston
Chicago
Detroit
Cleveland
Pittsburg
Cincinnati
St Louis
Cairo
Memphis
Vicksburg
Atlanta
Montgomery
Mobile
New Orleans
Escanaba
Saugeen
Toronto
Rochester
Albany
Eastport
Chatham
Oneida
Milwaukee
Grand Haven
Indianapolis
Louisville
Nashville
Augusta
Lake City
I
II
III
IV
NOTE.—The Roman letters show number and order of areas of low barometer. The figures above the lines show the days of the month; those below, 1, 2 and 3, indicate respectively the 7 A. M., the 3 P. M., and 11 P. M., (Washington mean time,) observations. The small circles on the lines indicate the position of the centre of the area of low barometer on the day and hour, written respectively above and below the line.
SIGNAL SERVICE.
IED BY ORDER OF THE SECRETARY OF WAR.
W. B. Hazen
VT. MAJ. GEN'L, CHIEF SIGNAL OFFICER, U. S. A.
West of Greenwich

WAR DEPARTMENT WE
SIGNAL SERVICE, U.S. ARM
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT OF
ISOBARS, ISOTHERMS AND PREVAILING WIND
PUBLISHED BY ORDER OF THE
BRIG. & BVT. MAJ. GEN'L, CHIE

TEMPERATURE AND WATER FOR 5 OCTOBER, 1881.

STATIONS.	Temperature of Air. Max.	Temperature of Air. Min.	Average depth of water in the day.
Atlantic City	77	59	6
Alpena	63.2	46.2	6
Augusta	80	62.5	14
Baltimore	78	66	16
Boston	65	49.1	12
Buffalo	70.2	51.2	12
Burlington, Vt.	65.2	50.3	10
Cedar Keys	94	76	9.4
*Charleston	76	70	10.6
Chicago	69	45.6	7.3
Chincoteague	76	56	4
Cleveland	71.6	57.8	12
Detroit	69	53	10
Duluth	57	46	13.6
Del. Breakwater	73	48	12.6
Eastport	49	46.5	13.6
Escanaba	59	46.5	13
Galveston	83	61	14.9
Grand Haven	69	51	13
Indianola	94	70	8.8
Jacksonville	93	76	13
Key West	88.1	77.3	17.2
Marquette	49	43	10
Milwaukee	54.5	46.5	6
Mobile	86.5	73.8	17.6
New Haven	73.4	58.7	14.6
New London	69	55	13
Newport	69.5	54.6	11.6
New York	73	57.5	12.6
New Shoreham	64	50.9	9.6
Norfolk	80	66	15.9
Pensacola	82.5	73.7	15.9
Portland, Maine	57.5	42.5	10.6
Portland, Or.	56	44	73.2
Port Eads	80.4	70	9.3
Punta Rassa	94	77.1	11.6
Sandusky	66.7	50.5	10
Sandy Hook	72.3	56.6	4
San Francisco	59.6	54.8	20
Savannah	91	71	10.6
Smithville	90	69	10
Thatcher's Island	61	47.5	7
Toledo	73	56	11.9
Wilmington	81	69.5	6
Wood's Holl	66.5	55	8

*Observations wanting—See text.

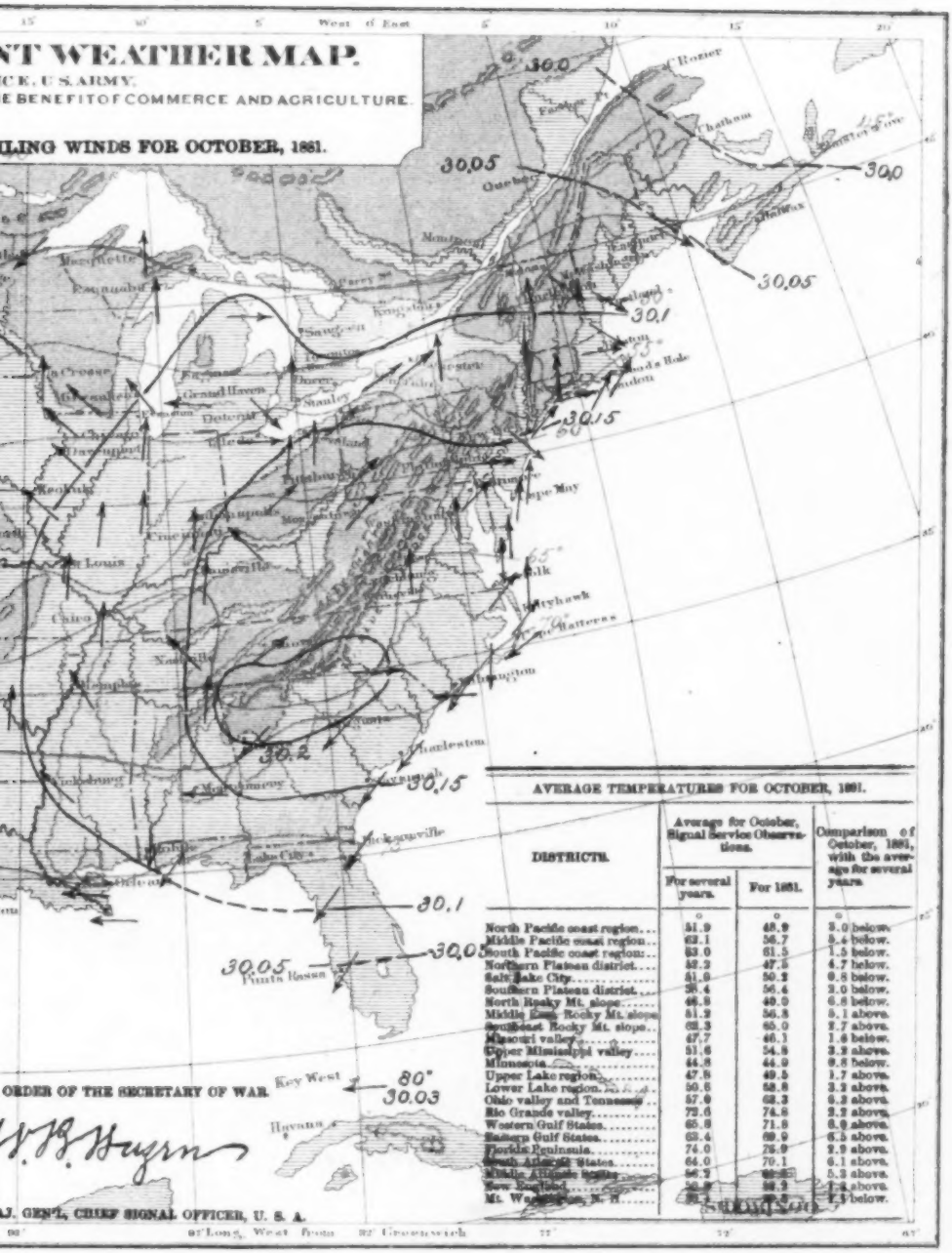
No. II.

NT WEATHER MAP.

CE, U.S.ARMY.

E BENEFIT OF COMMERCE AND AGRICULTURE.

LING WINDS FOR OCTOBER, 1881.



ORDER OF THE SECRETARY OF WAR.

W. B. Hazen

J. GEN'L, CHIEF SIGNAL OFFICER, U. S. A.

AVERAGE TEMPERATURES FOR OCTOBER, 1881.

DISTRICTS.	Average for October, Signal Service Observations.		Comparison of October, 1881, with the average for several years.
	For several years.	For 1881.	
	°	°	°
North Pacific coast region	51.9	48.9	3.0 below.
Middle Pacific coast region	62.1	56.7	5.4 below.
South Pacific coast region	63.0	61.5	1.5 below.
Northern Plateau district	52.2	47.5	4.7 below.
Salt Lake City	51.6	50.2	0.6 below.
Southern Plateau district	59.4	56.4	3.0 below.
North Rocky Mt. slope	46.8	40.0	6.8 below.
Middle Rocky Mt. slope	51.2	56.8	5.1 above.
Southeast Rocky Mt. slope	62.3	65.0	2.7 above.
Missouri valley	47.7	46.1	1.6 below.
Upper Mississippi valley	51.6	54.8	3.2 above.
Minnesota	44.8	44.0	0.8 below.
Upper Lake region	47.8	49.5	1.7 above.
Lower Lake region	50.6	53.8	3.2 above.
Ohio valley and Tennessee	57.0	62.3	5.3 above.
Rio Grande valley	72.6	74.8	2.2 above.
Western Gulf States	65.8	71.8	6.0 above.
Eastern Gulf States	63.4	69.9	6.5 above.
Florida Peninsula	74.0	76.9	2.9 above.
South Atlantic States	64.0	70.1	6.1 above.
Middle Atlantic States	56.2	61.5	5.3 above.
New England	46.8	48.2	1.4 above.
Mt. Washington, N. H.	32.2	30.9	1.3 below.

AVERAGE PRECIPITATION FOR OCTOBER

DISTRICTS.	Average for October. For many years.	Average for October. 1881.	Comparison of October, 1881, with the average for many years.
	Inches.	Inches.	Inches.
New England	3.07	2.17	0.90 deficiency.
Middle Atlantic States	3.39	4.29	0.90 excess.
South Atlantic States	4.69	2.69	2.00 deficiency.
Florida Peninsula	5.98	1.98	4.00 deficiency.
Eastern Gulf States	3.01	3.25	0.24 excess.
Western Gulf States	3.73	7.65	3.92 excess.
Tennessee	3.98	4.37	0.39 excess.
Ohio Valley	2.87	4.45	1.58 excess.
Lower Lake Region	3.18	5.34	2.16 excess.
Upper Lake Region	3.19	6.43	3.24 excess.
Upper Mississippi Valley	2.27	6.79	4.52 excess.
Minnesota	2.17	3.06	0.89 excess.
Lower Missouri Valley	3.41	5.93	2.52 excess.
Upper Missouri Valley	0.88	1.32	0.44 excess.
North Pacific Coast Region	2.76	3.44	1.68 excess.
Middle Pacific Coast Region	0.80	0.90	0.10 excess.
South Pacific Coast Region	0.39	0.34	Normal.

No. III.

HEIGHTS OF RIVERS ABOVE LOW-WATER MARK, OCTOBER, 1881.

STATIONS.	Danger point on gauge.	HIGHEST WATER. Date.	Height.	LOWEST WATER. Date.	Height.
	ft. in.		ft. in.		ft. in.
RED RIVER.					
Shreveport	20 0	31	16 4	October 1, 5	2 9
ARKANSAS.					
Little Rock	— —	8, 9	9 6	1	— 1 6
MISSOURI.					
Yankton	25 0	7, 8	2 8	20	1 5
Omaha	16 0	2	6 2	17	5 6
Leavenworth	21 0	12, 13, 14	7 8	24, 25	6 11
MISSISSIPPI.					
St. Paul	14 6	10	13 1	1	10 6
La Crosse	18 0	17	15 3	21	9 6
Dubuque	21 10	24, 25	21 2	1	15 3
Davenport	18 0	25, 26, 27	17 6	1	11 8
Keokuk	14 6	30	10 7	1	11 5
St. Louis	30 0	26	25 2	1	14 6
Cairo	40 0	24, 25	23 6	1	11 7
Memphis	34 0	30, 31	17 4	2	8 0
Vicksburg	41 0	31	23 2	1	6 3
New Orleans	— 2 6	31	10 8	11, 12	— 1 4
OHIO.					
Pittsburgh	30 0	31	1 3	1	— 7 2
Cincinnati	50 0	2	6 2	14	3 3
Louisville	24 0	5	5 3	3	3 4
CUMBERLAND.					
Nashville	42 0	31	5 11	22, 25	0 5
TENNESSEE.					
Chattanooga	31 0	31	3 1	22	0 3
MONONGAHELA.					
Morgantown	20 0	30	0 9	2, 3	0 1
Pittsburgh	30 0	23	1 8	1	— 1 2
SAVANNAH.					
Augusta	— —	1	7 4	16, 17	4 7
WILLAMETTE.					
Portland, Or.	— —	31	2 10	16	1 6
Umatilla	— —	7	3 6	19	3 11
SACRAMENTO.					
Red Bluff	— —	28	1 11	31	1 2

* Below high water mark of 1874.

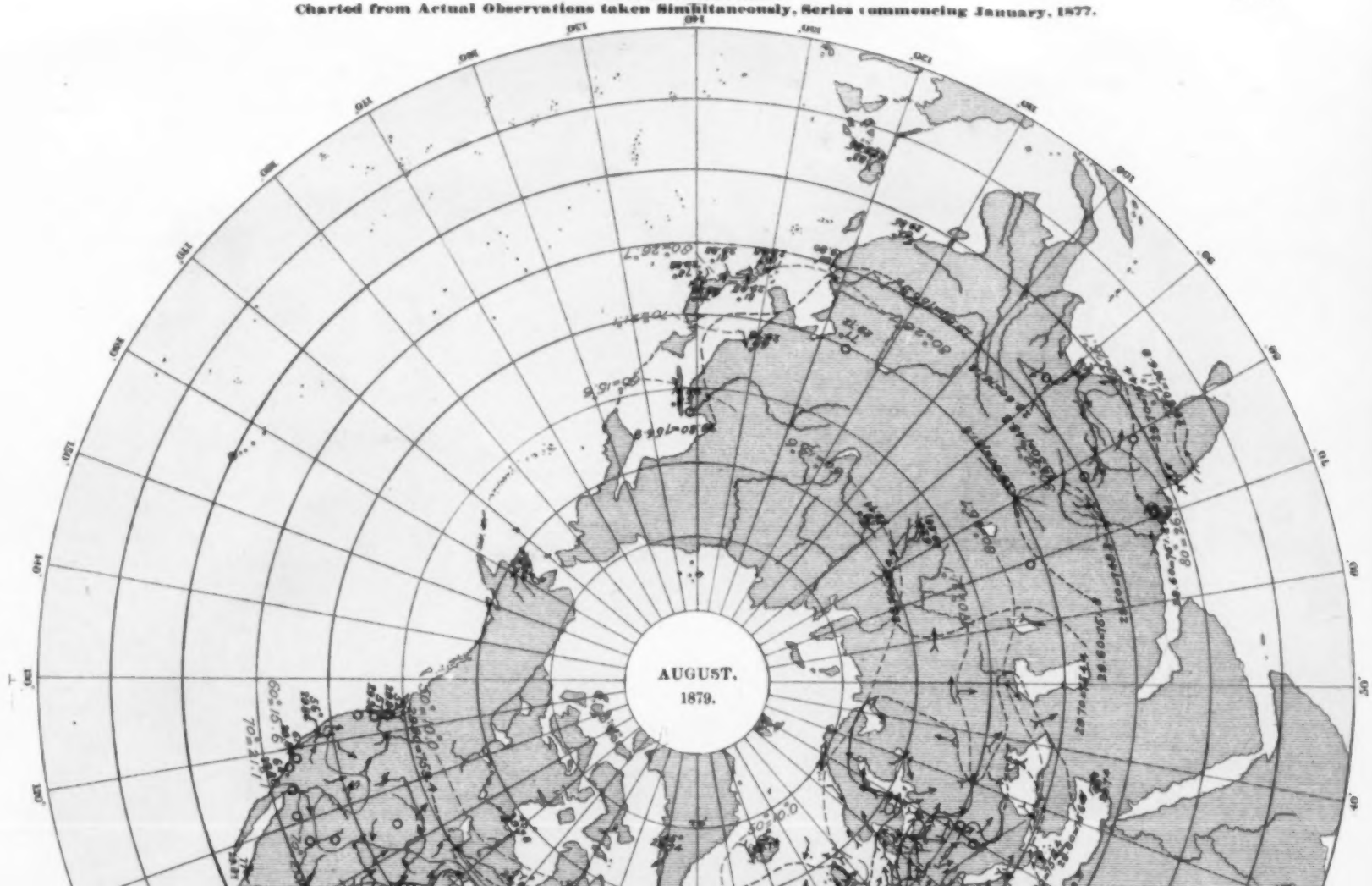
ST. DOMINGO

Office of the Chief Signal Officer,

UNITED STATES ARMY.

No. V.

Charted from Actual Observations taken Simultaneously, Series commencing January, 1877.



PREVAILING WINDS.

Arrows show the direction of, and fly with, the wind. Force is shown as follows:

Symbols.	Force.	Velocity.	
		Miles per hour.	Metres per second.
○	0	0	0
→	1, 2	0 to 9	0 to 4.0
→	3, 4	9.1 to 22.5	4.1 to 10.1
→	5, 6	22.6 to 40.5	10.1 to 18.1
→	7, 8	40.6 to 67.5	18.1 to 30.2
→	9, 10	67.6 up.	30.2 & over.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR

W. B. Hazen

Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

ISOBARS AND ISOTHERMS.

Isobars in *blue;* detached barometer means in English inches.

Isotherms in *red;* detached temperature means in degrees Fahrenheit.

Broken lines, are doubtful.

INTERNATIONAL MONTHLY CHART.

Showing mean pressure, mean temperature, mean force and prevailing direction of winds at 7:35 A. M., Washington mean time, for the month of August, 1879, based on the daily charts of the International Bulletin

Office of the Chief Signal Officer,

UNITED STATES ARMY.

Charted from Actual Observations taken Simultaneously, Series commencing November, 1877.

No. VI.

Storm-tracks in *Black*. The Arabic numerals show location of the centres of Low Barometer, at 7:35 A. M., Washington mean time, of that date.

Broken or dotted lines, are doubtful.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR

W. B. Hazen

Brig. & Bvt. Maj. Gen'l,
Chief Signal Officer, U. S. A.

INTERNATIONAL CHART.

Showing Tracks of Centres of Low Barometer for November, 1879.